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Discrimination in the U.S Mortgage Market: A Historic Overview of Discriminatory Practices and How the Rapid Expansion of the Secondary Market has Reshaped them and the Incentives Behind Them

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**Discrimination in the U.S Mortgage Market: A Historic Overview of
Discriminatory Practices and How the Rapid Expansion of the Secondary
Market has Reshaped them and the Incentives Behind Them**



Senior Project submitted to
The Division of Social Studies

by

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Abstract

My paper contributes to the existing literature regarding discriminatory practices in the mortgage market. It is argued that the development of the mortgage market, and specifically the rapid expansion of the secondary market, gave rise to new discriminatory practices (predatory lending, algorithmic based discrimination). My project analyzes the specifics of these developments and how they are associated with the introduction of these current discriminatory acts, outlines the changing incentives behind them and argues that current legislation has been proved to be too inflexible to adapt to the changing nature of the mortgage market and of the practices themselves. Furthermore my suggestions provide insights on how existing legislation can become more flexible in order to be able to identify such newly introduced discriminatory practices and recommend ways to monitor the sophisticated statistical decision making process of today.

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Introduction

The mortgage market and the discriminatory practices involved in it have evolved drastically over the past couple of decades. The creation of the GSE's and the secondary market (Fannie Mae, Freddie Mac), the introduction of the process of securitization and the increased financial complexity of mortgage products that came with the latter development blurred incentives behind potential discrimination and altered the forms and character of discriminatory practices. The securitization of housing mortgages has created a segmented lending process where the responsibilities of funding, originating, serving, and holding mortgage loans fall under unrelated business entities (Hauser, 2008). A number of new agents are now evolved in the decision-making process; mortgage originators, underwriters, mortgage brokers, assignees, arrangers. Each one of them possesses the means and incentives to discriminate at any part along the decision-making process, whether that is during the underwriting procedures or during the final 'assignment' of the loan. The increasing demand of mortgage products and the large number of new potential customers that resulted from the rapid technological advancements that caused wider accessibility to financial products introduced algorithmic decision-making process in the secondary market to efficiently cater to all the needs of the potential borrowers and to supposedly better the conditions under which the loans are approved.

Discriminatory practices that were once apparent, commonly used and widely accepted by financial and banking institutions such as redlining, slowly disappeared from the mortgage market, mainly because of the Civil Rights movement and the changing mentality towards prejudiced practices and bigotry, in general. All the afore-mentioned developments however gave rise to new types of discriminatory practices, such as those regarding predatory lending and algorithmic-based discrimination. My project analyzes the specifics of these developments and how they are connected to the newly introduced discriminatory acts, outlines the changing incentives behind the recent

discriminatory practices and argues that current legislation has been proved to be too inflexible to adapt to the changing nature of the mortgage market and of the practices themselves.

My findings are parallel with current literature in that existing legal doctrine has been unable to keep up with the changes within the mortgage market and the inherent discriminatory practices of algorithmic discrimination and predatory lending. For the latter, the existing definitions of predatory-lending practices leave room to lenders to craft mortgage products that fall outside the scope of federal legislation. Current antiquated legislation such as the 'holder in due course' doctrine and the 'do equity' requirement, furthermore offer little to no options to victims of predatory-lending practices. My analysis supports existing literature that aims in the abolishment of such antiquated legal frameworks.

For algorithmic-based discrimination, my analysis supports the notion that the legal framework surrounding it has proved to be ineffective since it provides little to no insight on how to monitor the sophisticated statistical decision making process of today. Courts and legislative bodies do not directly examine the exact variables involved in the algorithmic underwriting process, nor do they scrutinize the mortgage originator's decisions regarding the weight that was placed upon these variables. They rather focus on the mortgage originator's discretion policy, since it is quite difficult, to revisit the exact algorithmic decision-making process and its parameters that occurred in the past. My suggestion, from a legislative point of view, aims at refocusing attention from condemning the discretion given to the mortgage originators as causing pricing disparities to condemning the decision-making mortgage originators themselves. A measurement to achieve this, I suggest, would be to report and compare the underwriting details that are produced by the algorithmic 'Black Box' to what is actually later underwritten and assigned by the mortgage broker as a result of his discretion. In cases where there is a clear difference between these two sets of mortgage specific characteristics, one could assume that the differences are products of discriminatory incentives on the part of the mortgage broker.

Chapter 1

Discrimination in the mortgage market and how to address it has historically been a critical issue of the U.S civil rights agenda. It has been suggested that in the past, institutions such as banks and insurance companies actively discriminated against minorities, as practices such as redlining were common for lenders and were even adopted by government organizations. 'Redlining' is a term coined in the 1960's, whereby banks and other services, would literally draw a red lines around certain neighborhoods on city maps that had 'undesirable' demographics, such as predominantly African American neighborhoods. Since that time, housing and civil rights advocates have been actively trying to eradicate discrimination in the mortgage lending market. This has prompted the introduction of several bills that deemed any form of discrimination illegal, in the hope of totally eradicating these discriminatory practices, including 'Executive Order 11063' in 1962, and the 'Fair Housing Act' of 1968, which will be referred to later in the paper. Although the conditions for acquiring mortgages have, improved for minorities, discrimination still exists The mortgage market has grown into a complex financial system throughout the years, and the changing nature of discriminatory practices, makes it much more difficult to observe than during times when practices such as redlining, for example, were used. Today, discrimination in the mortgage market is subtler. My project will examine how the changing nature of the mortgage market has affected discriminatory practices and it is expected that a pattern of denial regarding mortgage lending to people of color will be observed and that loans approved to minority borrowers will have higher expected profitability than those to majorities with an almost identical credit background.

As the mortgage market was heavily legislated after the 2008, subprime mortgage crisis, the issue is still extremely critical. The next section will focus on the historical and legal context of discrimination in the housing market.

Historical and legal context of discrimination & redlining in the mortgage market

Race is a protected classification under the 14th Amendment to the Constitution passed in 1868. It declared that all states 'shall make or enforce any law which shall abridge the privileges or immunities of the citizens of the United States...[or] deprive any person of life, liberty or property without due process of law, [or] deny to any person within its jurisdiction the equal protection of the laws.' Congress passed the Civil Rights Act of 1866, among others to enforce this Amendment. (Dymski, 2002) The Act declared that all people born in the United States are legitimate citizens and as citizens, are guaranteed the right to 'make and enforce contracts', take legal action against those who breach them, etc. Throughout the years however the Supreme Court gave each state the responsibility of deciding the level of applicability of this Act. As a consequence, many states completely undermined its workings. It was during the Civil Rights Movement of the 1960's that social pressures lead to the demand for respect of all races. In 1962, President John F. Kennedy signed the 'Executive Order 11063', the first piece of legislation to ban discrimination in the housing market (Dymski, 2002). More specifically, it "prohibits discrimination in the sale, leasing, rental, or other disposition of properties and facilities owned or operated by the federal government or provided with federal funds." Fundamentally, it was the first piece of legislation to ban racial discrimination in federally funded housing. The Fair Housing Act of 1968, provided equal housing opportunities regardless of race, religion and national origin. This act 'makes it unlawful for any person or other entity whose business includes engaging in residential real estate-related transactions to discriminate against any person in making available such a transaction,.42 U.S.C. § 3601).

HOLC & Redlining

During the Great Depression the rapid expansion of the residential housing market created a housing 'bubble', which led to a series of major crises in the mortgage market during the 1930's. In the wake of these crises, Congress, under the presidency of Franklin D. Roosevelt established a series of federal policies, which aimed at reconstructing the nature of housing finance. These policies altered the nature of mortgages by turning them from short term loans to loans with 15 to 20-year durations.

Furthermore, Congress passed the Home Owners' Loan Act of 1933, which led to the creation of the Home Owners Loan Corporation (HOLC), and the National Housing Act in 1934, which partially led to the creation of the Federal Housing Administration (FHA). The Act of 1934, made an effort to stimulate the construction industry by overhauling the process of buying a home; before the Act, one could only receive a mortgage if one had a large amount of the mortgage payment already at hand. Furthermore, mortgages did not have the long-term durability they have today. The Act of 1934 allowed for a small down payment and monthly payments spread over 20 rather than 10 or 15 years. This was important as it created new opportunities for people who could not previously afford a house. The purpose of the 'Home Owner's Loan Act' of 1933 was to refinance home mortgages currently in default to prevent foreclosure (Carliner, 1998). Specifically, its initial goal was to issue bonds in order to be able to refinance mortgages at more favorable terms. This is important as it created new opportunities for people who could not previously afford to buy a house. In an effort to do this "residential security maps" of 239 cities were created to estimate the supposed level of security for real-estate investments in each city. These maps were based on both the input of thousands of local brokers and surveys of neighborhood housing markets together with demographic characteristics. In these maps the neighborhoods that were thought to be more secure in case of investment were marked with a green color and were known as a "Type A" neighborhoods, whereas the most risky areas were called "Type D" and were marked in red. Data

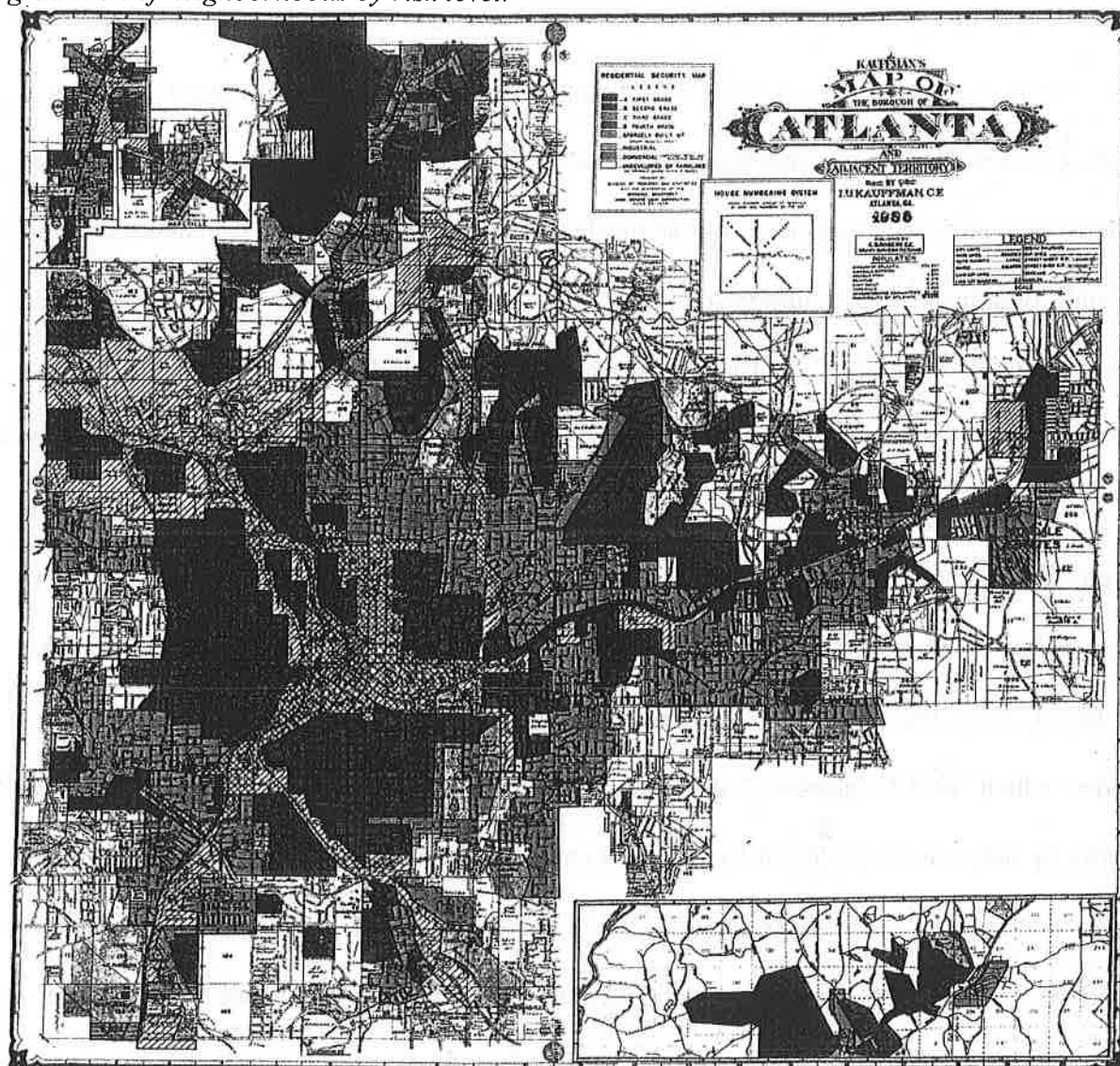
collected has shown that some areas were, in the long term, recorded as receiving fewer housing loans compared to others. There is clear evidence that showcases that the racial composition of an area played a huge role in the grade the area was assigned (Aaronson, Hartley, Mazumder 2019). Evidence of that is apparent in the description file of the HOLC maps¹. The inner cities 'redlined' areas, were in almost all cases, characterized by African – American communities and were left underdeveloped or left to decay, as any type of commercial investment in these communities was deemed to be too 'risky'. The reasons why loans in minority communities are riskier will be explained in a further chapter.

'Hillier (2005) quotes the 1937 FHLBB Appraisal Manual in describing neighborhood grades as follow'.

- Grade A = “homogeneous,” in demand during “good times or bad.”
- Grade B = “like a 1935 automobile-still good, but not what the people are buying today who can afford a new one”
- Grade C = becoming obsolete, “expiring restrictions or lack of them” and “infiltration of a lower grade population.”
- Grade D = “those neighborhoods in which the things that are now taking place in the C neighborhoods, have already happened.”

¹ *Area Description – Security Map of Tacoma: 'This might be classed as a 'Low Yellow' area were it not for the presence of the number of Negroes and low class Foreign Families who reside in the area.'*

Example of the original 1938 HOLC "Residential Security" map of Atlanta with color-coded gradation of neighborhoods by risk level.



The Federal Home Administration, which was responsible for almost half of all the houses sold during the 50's and the 60's, used racial criteria regarding the decisions on whether not to approve FHA loans for specific neighborhoods. This occurred as a result of both the Acts signed in 1933 and 1934. During the post-Great depression era, optimism and prosperity created a demand for new housing and the Government signed the 1934, Housing Act to encourage investment. In an attempt to boost the construction industry, banks decided to invest in new construction projects rather than re-investing in old neighborhoods. This, combined with the Federal Aid Highways Act of 1954, which provided Federal investments to expand the national highway system encouraged the

rise of the suburbs. Those who were not financially fortunate enough to be able to move to the suburbs remained in the cities. As a result of pre-existent discrimination, in almost all cases the communities that were unable to move in better neighborhoods were African – American. As a result of pre- existing discrimination, in many cases the communities that were unable to move into better neighborhoods were African – American. But as residents left the inner cities for the suburbs, so did businesses and investments. Many already deprived neighborhoods sank further into poverty. When old business collapsed, because of the lack of investment, new ones did not replace them, leaving sometimes-entire commercial blocks empty. Redlining in other words was the “discriminatory pattern of disinvestment and obstructive lending practices that act as an impediment to home ownership among African Americans” (Gaspire, 2012).

There is however an active debate from a historic and economic point of view on the exact impact the HOLC maps had on lenders. Hillier argues that the FHLBB (Federal Home Loan Bank Board) under which HOLC operated, did not in fact spread the maps but preserved their confidentiality by only allowing a limited number of copies to be made (Hillier, 2003). On the other hand Woods disputes these conclusions (Woods, 2012). It is argued in his paper that not only did the FHLBB widely spread their appraisal practices, but also encouraged the development of a communication channel between the private sector and government institutions that hugely influenced the creation of a ‘uniform appraisal process’ (*Aaronson, Hartley, Mazumder 2019*). His evidence also suggests that banks created their own maps to illustrate potential risky investments among neighborhoods as a part of their policy guidelines. He argues that ‘there existed a relationship between the HOLC security maps and FHLBB lending policies’(Woods, 2012). Woods points out that lending institutions in particular, had to incorporate a ‘security map of the institution’s lending area’ in their balance sheet and were specifically advised that ‘the best method of grading residential neighborhoods as lending areas is to make a scientific analysis of the entire community and of each neighborhood within it.’(Woods, 2012) Additionally, he introduces evidence that reflect the fact that

the Mortgage Rehabilitation Division of the FHLBB made security maps of residential areas, accompanied by simplified instructions, that could be used by any experienced mortgage lender and that the categories in such maps were almost identical to the HOLC maps.

There are even anecdotes that suggest that some lenders had access to the actual HOLC maps. Jackson argues that “private banking institutions were privy to and influenced by the government security maps” (Jackson, 1980). There is even evidence of a Chicago real estate agent communicating the following to the City Survey Program Director: “I hope to be able to ‘borrow’ a map from your portfolio when you are not looking during your journey in Chicago (*Hillier, 2003*). In a wider setting Greer suggests that a large number of real estate agents had a significant impact in the creation of these maps. (Greer, 2012)

While it is almost impossible to fully comprehend the extent to which mortgage lenders used these maps, It is evident that the FHLBB encouraged the practice of using similar maps to estimate the credit worthiness of a neighborhood. It is also evident that at that point in time at least, redlining was occurring on the basis of racial composition of the neighborhoods.

The unfairness of this issue was slowly fought against, firstly with the establishment of the Home Mortgage Disclosure Act in 1975, which ‘required lenders to report the number and dollar volume of residential loans by Census tract’ and the Community Reinvestment Act, which encourages institutions to meet their credit needs evenly among all neighborhoods (specifically low income neighborhoods)(Dymski, 2002). Furthermore, since 1990, all depository institutions over a certain asset-size threshold are required to post all available information, including the applicant’s race, for every single loan application. The process of redlining itself has almost disappeared throughout the years, but racial discrimination is still very present. In 1994 the federal agencies that were monitoring discrimination in the housing and credit market issued a policy statement that fundamentally shaped the legal meaning of discrimination. Three classes of racial discrimination

were identified (Marsden, 1994).

1. **Overt discrimination** – Flatly refusing to initiate a transaction with a person of color.
2. **Disparate treatment** – screening minorities more stringently than whites in application processes or subjecting minorities to different application processes.
3. **Disparate impact** –conducting commercial practices that disproportionately harm a racial minority without the justification of a legitimate business need.

The first two categories suggest that discrimination is a product of intentional prejudicial behavior. In the first case those discriminating are purposely denying minorities certain transactions, while the second case describes behavior that, although it might be unintentional, is, nevertheless harmful in its impact.

In the third category, disparate impact, occurs when systematic procedures that appear to be neutral, result in a disproportionate impact on the protected minority group. If a business model does not justify these practices then the racial divisions that the practices result in, are not perceived to be socially legitimate..

Theoretical Models of Discrimination and Redlining in the Housing Market

The root of the controversy surrounding racial discrimination in the mortgage market lies in the origins of the theoretical work on this topic. Empirical models on housing discrimination were developed without reference to the Civil Rights era legislation (Dymski, 2002). The fundamental models assume that racial discrimination will be benign as employers who practice racial exclusion will sacrifice income to satisfy their prejudicial tastes. Thus according to these models any action against the racially biased is unnecessary as they are punishing themselves. The only text that analyzed racial discrimination and was in sync with the rise of the civil rights movement was Gary Becker's 'The Economics of Discrimination'. His "tastes and preferences" approach towards market

labor discrimination has been dominant over the past years and his findings act as a pillar of general theory that can be applied to different forms of discrimination. He defines discrimination in monetary terms, associating it with the disutility caused by the contact with some individuals and believes that if someone "has a taste for discrimination, he must forfeit income to prevent that contact" (Becker, 1971). Thus discrimination is costly for the employers who choose to sacrifice profits to strengthen their preferences. In a competitive market it is assumed that the discriminator will fail to survive, as the non-prejudiced competitor will incur lower costs than the discriminator and in the long run he will either stop discriminating or close down. Thus, there is no need for interference, as discrimination will disappear by itself. In the housing market Becker's theory assumes that in a case where all white residents are bigots, whites will pay a premium to avoid areas with a strong minority representation. In other words the discriminator is paying in order to practice his racist tendencies. But if all real – estate agents are also bigots and in combination with other racial covenants force the minorities into restricted neighborhoods, the minorities are the ones who truly pay the premium for lower-quality homes, as following the economic rule of supply and demand, the large numbers of non-whites looking at a restricted number of homes increases the price of the houses. (Dymski, 2002)

Masson's (1973) and Courant's (1978) models developed an empirical theory that applies the Becker-type point of view to the housing market. They examined the case where searching for housing is costly and where all white agents are discriminators. Their results proved that Becker's theory of the discriminator paying is invalid, as racial discrimination makes searching for housing more costly for minorities than for whites (Dymski, 2002) The minorities end up paying more while being able to search less. Furthermore, Yinger's model witnessed racially neutral landlords discriminate against minority renters as a result of the bigoted white residents who lived in the premises. (Yinger, 1975)

Dymski's theory is particularly important as it develops the concept of discriminatory costs that are not necessarily created by people who have prejudicial tendencies. In his application of the Becker model to the credit market he found out that while bankers may have no overtly racist tendencies, they might indeed offer stricter credit terms on lending in white communities, where a substantial number of white bigots exists (Dymski, 1995). He also found that in cases where minorities prefer white neighborhoods, 'rational' bankers protect their profits, that is, the higher premiums paid by white residents in order to keep their neighborhoods minority free. It is therefore clear that there can be racial prejudice without racist intent, as the perpetrators are not motivated by hate but by profit. In such cases, discrimination costs are passed to minorities. Furthermore banks might 'rationally' discriminate against minorities who are economically equal to their white counterparts, particularly young couples, on the basis that minorities have lower future income levels. Helen F. Ladd presents a further example of discrimination practices following profit-maximizing guidelines (Ladd, 1998). Savings and loan associations or other depository lenders gain funds through the deposits of the local residents. If these local residents are prejudiced to the extent that they would prefer if minorities did not share the same neighborhood, then it is unlikely they will deposit their funds in institutions that are known to provide mortgages to minorities. Hence institutions as such will cave into the prejudice of their customers, in order to maintain profit-maximizing goals.

The asymmetric distribution of information can also encourage racial discrimination. Informational problems regarding the credit worthiness of applicants between lending institutions and prospective borrowers in white and minority communities might lead to potential redlining, as shown by Weiss and Stiglitz (1991). If banks are for any reason unable to distinguish between the more promising borrowers, but think that loans on property within the minority communities are in fact riskier, then they will not undertake any further lending actions in order to minimize any potential risk. Two explanations exist regarding the riskiness of minority communities. Firstly stated

by Guttentag and Wachter (1980) their theory explains redlining due to 'neighborhood externalities and information costs'. Their argument is based on the fact that in any residential community, 'the return on lending depends on the total volume of lending there...[and] lenders concentrate their lending where other lenders are making loans'. In other words, any prospective borrower requesting a loan in an affluent neighborhood will be met with favorable circumstances, as the banker understands the probabilities of the borrower repaying the loan are more than sufficient. In the same manner prospective borrowers that request loans in minority neighborhoods will be perceived with hesitation, as the banker from experience knows that loans in these areas are more likely to default deeming them riskier. The second explanation was given by the same authors and suggests that when it is costly to gather information on the borrower and statistics correlating racial and economic characteristics are readily available, banks will 'rationally' use racial composition of the neighborhood as a cheap screening process for prospective clients. For Kenneth Arrow and Edmund Phelps, unequal treatment is also a result of "statistical" discrimination; "that is, discrimination that occurs because the lender finds it cheaper to use the characteristics of an applicant's group, such as its race, to estimate the applicant's creditworthiness rather than the applicant's own past history" (Arrow, 1973, Phelps, 1972). By Arrows definition, discrimination will not be driven away by the existence of a competitive market.

Helen Ladd (1998) presents further evidence that support the notion that lenders statistically discriminate against minorities while also maintaining profits. "Lenders might believe, for example, that discrimination against minorities in the labor market could make the income of minorities more volatile on average... and hence make minorities more likely to default." Thus again, race is shown to be a cheap tool used as a screening process to distinguish between applicants.

To summarize: the theoretical models of discrimination in the housing and credit market have underlined three causes of discriminatory procedures.

'1) **Personal discrimination (bigotry)**: racially differential outcomes that are due to racial preferences unrelated to economic factors.

(2) **Rational discrimination**: racially differential outcomes that arise when agents use race or characteristics correlated with race to make valid statistical inferences about the distinct market prospects of different racial groups.

(3) **Structural discrimination**: racially differential outcomes that arise because of identifiable economic factors associated with the agents or property involved.' (Dymski, 2002)

Suppose a number of minorities and whites are all prospective applicants for a limited number of loans. The lender will make the decision on whom to lend to, based on their current wealth level and their predicted future income. In the case that minorities have lower wealth levels than the whites, then they are structurally discriminated against. If on the other hand their level of wealth is equal to that of the whites, they are rationally discriminated on the basis that the prospective income of minorities on average is lower than whites. Thus (2) focuses on anticipated disparities while (3) on existing disparities.

It is clear that the discriminatory theory on the housing market has evolved throughout the years. Becker 's relatively simple model has been questioned constantly since it was firstly published. The above theories suggest that discrimination will not in fact disappear by itself and there is indeed a need for outside control and monitoring. Nevertheless, the economic theories developed independently of the legal context that was presented, creating an imaginary void between the empirical work and the legal framework. To the current day discriminatory behavior cannot be perfectly identified as the argument that certain minority applicants are accompanied with worse economic fundamentals than their white counterparts. Furthermore, new discriminatory practices have been introduced and have evolved, an example being the recent phenomenon of predatory lending and will probably continue to evolve in the future. It is thus detrimental to identify and contextualize the types of discrimination present as each one is combated and addressed differently.

Empirical studies on redlining and discrimination in the credit markets have been mostly inconclusive due to the following reasons:

- a) Data restrictions that preclude statistical study of inequality in certain credit markets.
- b) Ambiguous legal and theoretical definitions of discrimination (Dymski, 2002)

Furthermore researchers have recently suggested that the changing structure of the banking and lending market may possibly affect the results drawn from studies of discrimination. As the banking system is constantly re-organizing its structures, the character of mortgage-based discrimination is changing with it. The recent wave of mergers in the industry due to intensified competition has been forcing banks to shut down smaller branches, especially in minority neighborhoods, which in turn, increases structural discrimination.

The Federal Reserve Bank of Boston Study

The Federal Reserve Bank of Boston conducted one of the leading studies in the field of mortgage discrimination and redlining in 1996. The study was a major breakthrough in the field as, instead of testing the hypothesis of whether redlining is occurring by controlling the characteristics of a neighborhood, they examined the role of the racial composition of the neighborhood by controlling for race. Furthermore, the study stood out since it included vital variables to the mortgage lending process that were omitted in previous studies. In cooperation with other regulatory agencies they collected a large sample of mortgage applications in the Boston MSA in order to collect data including all available information on neighborhood, personal and property characteristics.

Table I			
Mortgage Denial Rates			
	White Tracts	Minority Tracts	Total by race
White applicants	10%	17%	10%
Minority applicants	24%	33%	28%
Total by tract	12%	31%	

The study relied partly on the 1990, Home Mortgage Disclosure Act (HMDA) data for the Boston Metropolitan Statistical Area. The table above, which was produced through the HMDA data only, indicates that minority applicants generally face an almost three times higher chance of being denied a loan as compared to their white counterparts. Specifically, it also indicates that applicants in minority tracts also face a three times higher chance of being denied a loan when compared to applicants in white areas. Most importantly however for the time being, was the fact that both whites and minorities faced a higher chance of being denied if the property was located in a minority tract, as the traditional redlining theory predicts. This general pattern of loan refusal among minorities however was heavily scrutinized since the HMDA data set only includes one important economic variable, income.² Since it only includes income, the Federal Reserve Bank of Boston gathered additional data on 38 additional variables from the lender's files by adding an extensive follow up survey to the HMDA data set. Several variables were taken from credit reports and property appraisals while additional variables were chosen after extensive conversations with mortgage underwriters and brokers. Variables and measures such as *'the ratio of housing expense to income, the ratio of total debt to income, the stability of the applicant's employment, the applicant's commitment to debt repayment, as measured by credit history; the loan-to-value ratio, the presence of private mortgage insurance, and the stability of the value of the mortgaged property and characteristics of the property, such as single-family versus multifamily units'* were included.

² pg. 5 Boston Fed

Information on neighborhood characteristics such as *median income in tract*, and the according variables were taken from the Census data as a supplementary source of information. The Census data were also used in order to calculate the racial composition of the tracts (Tootell, 1996).

Their result show that lenders do not discriminate on the basis of the racial composition of the tract, 'although they may discriminate based on the race of the applicant.' In order to isolate the effect the individual race of an applicant might have on the decision making process from the racial composition of the tract where the applicant resides, their regression to predict the probability of the applicant being approved for a mortgage, included both the individual characteristic of the race as a variable and a combination of variables which are mentioned further below, to calculate the racial composition of the tract. By doing so, they manage to capture the effect of the race of the applicant while accounting for the tract's characteristics. This means that any evidence of discrimination will be capturing the effect of the race only, and not the effects of omitted variables that are correlated with tract characteristic, since those are included in the regression. In fact, in contrast with previous studies that have resulted in concluding that tract-specific characteristics such as racial composition affect the mortgage lending process, the Federal Reserve has found no evidence that the racial composition of the tract is significant in the lending process. Furthermore, the study provided evidence that opposed the notion of lenders redlining in a racial way. Redlining could be possibly based on other tract specific characteristics that do not include its racial composition. Tracts with a higher rate of vacancy and boarded up property naturally face higher rejection rates independently of the race of inhabitants. In order to account for the possibility that tract specific characteristics have an effect on the decision making process, they added to the base equation tract variables such as 'the rent-to-value ratio for property in the area, the median income level of households in the neighborhood, and the vacancy and boarded-up rates in the tract.' Nevertheless the presence of these variables did not affect the results on discrimination and redlining, since both variables that measure the effect of the racial composition of the tract are still insignificant.

“Areas appear to be redlined only because they are inhabited by minorities; if more whites moved into minority neighborhoods, the rate of lending in these areas would tend to increase”(Tootell 1996). When testing the hypothesis that minority areas are being redlined, they expected to see higher rejection rates in these areas even after controlling for any variables that might affect the rejection rates. Indeed, the coefficients on both variables of minority area status indicate that applications originating from minority tracts have a 6 percent higher chance of being denied than similar applications from white areas. This is in fact evidence of red-lining occurring. Nevertheless, when the race of the applicant was included as a controlled variable, as in an attempt to isolate any possible redlining of minority areas, the coefficient of lender redlining became completely insignificant, while the coefficient that measures race is significant in all equations. This result indicates that lenders only seemed to redline before, since race had an effect in both the mortgage lending process and in the racial composition of the tract. This is evidence that racial discrimination is occurring but not based on the racial composition of the neighborhood.

Tootell also tested the possibility of indirect forms of redlining. Private mortgage insurance (PMI) is a critical aspect contributing to the mortgage decision since almost all applications that fail to acquire PMI usually also fail to be approved for the loan and all applications that do in fact acquire it, pay more for the actual loan. Essentially PMI is acquired by the borrower in order to protect the lender's interests in case of asset price deflation or possible costs in case of foreclosure. The hypothesis tested by Tootell takes the following form: ‘Since PMI is costly, if applications for loans on properties in minority tracts, or from minorities, are more likely to be forced to acquire PMI, the redlining, or discrimination, would be in terms of price rather than action taken.’ In order to observe if minorities are pushed towards the purchase of PMI more aggressively than their white counterparts, it is essential to first outline what determines whether a borrower is required to purchase a PMI in the first place. In most cases, PMI is demanded when the down payment is less than 20 percent of the expected value of the property and the loan will be sold in the secondary

market. If the loan is held in the bank's portfolio though, applicants might be required to purchase even if the down payment is greater than 20 percent. Furthermore, the most important determinant of whether PMI is demanded is whether the loan-to-value ratio is greater than 80 percent.' Finally a bad credit score or mortgage history will increase one's chances of being requested to purchase PMI.

Tootell's findings result in evidence that indicate that possible discrimination present in the decision to acquire PMI 'raises concerns about whether the variable in the base regression indicating that PMI was denied is masking redlining in the mortgage lending decision.' In other words any evidence of discrimination in mortgage denials is also contained in the PMI denials. Although there is little to no evidence from this study that suggest that the racial composition of a tract might have an effect on the mortgage lending decision, there are some results that prove that whether one will be requested to apply for a PMI can depend on the customer's tract racial composition.

Since there is enough evidence that indicates that the race of the applicant might directly affect the decision behind mortgage lending, one could possibly conclude that this study has successfully proven the existence of discriminatory practices in the mortgage market. On the other hand, one could also interpret the positive coefficient on the race variable, as evidence of something else. Firstly, omitted variables that are correlated with both the race of the applicant and the decision making of a mortgage process might still exist. Secondly, statistical discrimination might be the leading cause of the higher denial rate of mortgage applications by minorities since race could be used as a proxy for loan profitability. In other words statistical discrimination occurs if the following is true: *'If the default rate for minorities, holding all else in the lender's information set constant, is higher than the rate for whites, statistical discrimination could produce a significant race coefficient in the denial equation'* (Tootell, 1996).

The afore-mentioned two points would be valid counterarguments to the study only if Tootell had not predicted and expected them, as a close look of his data set showcases that no important variables have been omitted. Furthermore, although Tooteell's data were not intended to identify

potential statistical discrimination, 'what information they do contain concerning this issue does not justify the conclusion that race's use as a signal of a higher conditional default probability, explains the size and significance of its role in the mortgage lending decision.' By creating the likelihood of defaulting on other forms of debt, as a function of race and almost every other personal variable of every individual applicant using the applicant's credit history as the dependent variable, if statistical discrimination was indeed occurring then the coefficient of race should not be significant. Their findings however, produced a significant coefficient even after controlling for default rates. The positive coefficient indicates thus that there is no form of statistical discrimination occurring in the data set. This debate however is purely theoretical since in any case the form of discrimination should not matter from an enforcement point of view since all are illegal.

The Federal Reserve study provided the most insightful information on the matter of discrimination in the mortgage market and specifically on the practice of redlining; an extremely widely applied practice that was almost legal at certain times. This practice though, had begun already disappearing at the time Tootell first published his findings. Nevertheless they were quite innovative. An emphasis was placed on how the racial composition of a tract plays a role in redlining by controlling for the race of the borrower. It appears that the racial composition of the tract does not in fact have a direct impact on the lending decision. It is the race of the applicant, Tootell findings suggest, that produces the reluctance of lenders to provide lines of credit to minorities independently of the community racial composition of the tract that minorities happen to live in. The findings were specifically important as then, bank regulation revolved around tract-specific characteristics, like it's racial composition and not the race of the applicant itself and how it might be related to the mortgage lending decision. Furthermore its findings were so fundamental to the current understanding of mortgage market discrimination because they were so strongly supported. Studies of mortgage lending are usually scrutinized since they come hand in hand with serious limitations.

Firstly, most studies on this subject have encountered problems in acquiring a complete set of variables since most of them rely primarily on the HMDA data set, which only includes one important characteristic about the applicant, 'income'. Lenders on the other hand place much more focus on a combination of variables, which are not included in the HMDA data set. To overcome this fundamental limitation, the Federal Reserve collected 38 additional variables for a sample of applications in the Boston MSA. To calculate the racial composition of the tract Census data was used. Any variables that could not be collected through these two data sets were gathered from credit reports, lender's worksheets and through extended conversation with mortgage loan officers and mortgage underwriters; 'the fact that they all felt the survey was far too inclusive is one indicator of its thoroughness. Thus the argument that there might be omitted variables that produce the significance in the racial coefficient cannot be supported in this paper since it includes an incredible amount of data sources and variables.

Table III
Values of Variables Collected on 1992 Follow-up Survey

Characteristic	Applications by Whites		Applications by Blacks/Hispanics	
	Accepted	Rejected	Accepted	Rejected
Personal/Financial Characteristics				
1. Mean age of applicant	36	36	37	37
2. Mean age of coapplicant	26	22	24	23
3. Mean years of school (applicant)	16	15	14	14
4. Mean years of school (coapplicant)	11	9	9	9
5. Mean number of applicant dependents	0.71	0.82	0.98	0.94
6. Mean number of years in line of work (applicant)	11	11	9	8
7. Mean number of years in line of work (coapplicant)	8	9	7	6
8. Mean number of years on job (applicant)	7	6	6	5
9. Mean number of years on job (coapplicant)	5	6	5	4
10. Proportion self-employed	0.12	0.22	0.08	0.07
11. Mean base monthly income (applicant)	4,439	4,150	3,186	3,008
12. Mean base monthly income (coapplicant)	1,378	1,475	1,169	1,115
13. Mean total monthly income (applicant)	5,096	4,911	3,581	3,359
14. Mean total monthly income (coapplicant)	1,484	1,684	1,276	1,269
15. Mean proposed monthly housing expense (\$)	1,499	1,579	1,229	1,209
16. Mean purchase price (\$)	198,000	189,000	151,000	149,000
17. Mean value liquid assets (\$)	94,000	140,000	40,000	43,000
18. Mean value total assets (\$)	365,000	442,000	139,000	101,000
19. Mean of networth	275,000	354,000	103,000	64,000
20. Mean total nonhousing monthly payments (\$)	474	588	391	522
21. Mean value of total liabilities (\$)	90,000	88,000	36,000	37,000
22. Mean obligation ratio (housing expense/income)	24.80	28.50	25.20	29.0
23. Mean total obligation ratio (total obligations/income)	32.00	40.32	32.83	39.69
24. Mean of unemployment region	3.81	4.37	3.61	3.71
25. Mean of probability of unemployment	0.19	0.22	0.23	0.23

<u>Credit History</u>					
26.	Mean of no late mortgage payment	0.35	0.25	0.17	0.09
27.	Mean of one or two late mortgage payments	0.01	0.04	0.01	0.02
28.	Mean of no mortgage payment history	0.63	0.67	0.81	0.87
29.	Mean of more than two late mortgage payments	0.01	0.03	0.00	0.02
30.	Mean of no "slow pay" consumer account	0.62	0.37	0.53	0.21
31.	Mean of one or two slow pay consumer accounts	0.19	0.19	0.13	0.11
32.	Mean of more than two slow pay consumer accounts	0.05	0.08	0.08	0.10
33.	Mean of insufficient consumer credit history	0.02	0.03	0.07	0.13
34.	Mean of delinquent consumer credit history	0.07	0.11	0.08	0.20
35.	Mean of serious consumer delinquencies	0.05	0.21	0.12	0.26
36.	Proportion with public records	0.04	0.22	0.09	0.31
37.	Mean number of commercial credit reports on file	1	2	2	1
38.	Mean number of credit lines on report	14	15	11	11
<u>Loan and Property Characteristics</u>					
39.	Fixed loan	0.68	0.66	0.60	0.69
40.	Mean term	347.23	346.84	356.27	357.79
41.	Special Programs	0.03	0.03	0.17	0.20
42.	Mean appraised value of property (\$)	208,000	192,000	159,000	153,000
43.	Proportion denied private mortgage insurance	0.00	0.15	0.00	0.18
44.	Mean of loan-to-value ratio	0.74	0.83	0.85	0.88
45.	Mean number of units in property purchased	1.12	1.25	1.36	1.58
<u>Neighborhood Characteristic</u>					
46.	Mean of rent to value ratio in Tract	0.08	0.10	0.12	0.17
47.	Median income in tract	56,091	54,767	40,279	36,891
48.	Boarded-up rate	.02	.02	0.06	0.05
49.	Vacancy rate	.06	.06	0.07	0.08
50.	Mean in minority tracts	48	10	191	95
51.	Mean in white tracts	1965	220	299	97
Note: Percentage base for each item does not include applicants for whom information was missing					

Note: Percentage base for each item does not include applicants for whom information was missing.

(Tootell, 1996).

The mortgage market however has evolved rapidly since this publication and even more since the years when redlining was actively taking place. The development of the mortgage market also brought with it the development of other discriminatory practices. While the findings of the Fed study were detrimental to the understanding of how redlining had been transformed through the years, they were only relevant to that, the discriminatory practice of redlining, which had already started disappearing in the early 1990's. Numerous other practices have evolved throughout the years and the incentives behind them vary considerably than the incentives of the discriminatory practices that occurred in the past. Practices that, unfortunately in a way, had not been observed at the point of time when the Federal Reserve conducted this study and unfortunately as well, have not been as thoroughly analyzed as the practice of redlining, since no study that meticulous has been produced in the recent years. My next chapter is going to analyze how the mortgage market evolved, specifically how the creation of two government-sponsored enterprises of Fannie Mae and Freddie

Mac created the process of securitization and how this process, has given rise to new discrimination practices and new incentives behind any potential discrimination. Specifically, how the rapid technological advances in the mortgage market created opportunities and accessibility to a much wider spectrum of mortgage products. The increasing demand and the large number of new potential customers combined with the technological advancements of the time, introduced the use of algorithms in the decision making process to supposedly better the conditions under which loans are approved or underwritten. Moreover, the increasing complexity of the financial instruments and mortgage specific details that came with the creation of the G.S.E's introduced new agents the decision making process, whose interests do not always align with that of the consumers. These two fundamental factors gave rise to predatory lending, a practice which has been solely observed in the secondary market.

Chapter 2

The Evolution of the Mortgage Market

The home mortgage market has been reshaped since the deregulation acts of the 1980s, when the banking system consisted of segmented markets. At that point of time commercial banks rarely issued mortgages. Savings and loan associations collected household deposits that would finance home mortgages, which were often underwritten by the Federal Housing Administration (FHA). When these institutions suffered from high default rates and 'an interest rate mismatch between short-term deposits and long-term fixed-rate mortgages', the two government-sponsored enterprises, (GSE)-Fannie Mae and Freddie Mac (Federal Home Loan Mortgage Corp) vastly expanded the MBS(mortgage backed securities) market. These two institutions had established the secondary market for mortgages. Due to their small line of credit from the Department of Treasury, these GSE's were perceived as being completely supported by the federal government (Pickert, 2008). The GSEs

were created to provide mortgage securitization. They practically bought mortgages from lenders, in order for lenders to lend out more money. They then packaged those mortgages in the form of 'agency' MBS (mortgage backed securities) and resold them. Private label MBS were also created and were issued by investment banks. The specifics of the process of securitization though, will not be analyzed in this paper. Nowadays the GSE's purchase and securitize more than 90% of the conventional mortgage market in the US. Since they hold the role of guarantors, they have established a pricing grid, which determines the price of credit risk. This grid determines the price of the default risk among different credit score and loan – to value buckets. Essentially it is the price lenders are obliged to pay in order for the GSE's to absorb the risk of a potential default. Any deviation from this pricing grid reflects the lenders incentive to increase profits. (Bartlett , 2019)

It is important nevertheless to understand that through the creation of the GSE's, the mortgage market slowly evolved in a way that blurred incentives behind potential discrimination and altered the forms and character of discriminatory practices. The funding for loans did not rely on customer deposits anymore but on investments through mortgage backed securities. Non-depository mortgage banks could now originate loans being only driven by the incentive to sell them in the secondary market. The secondary market developed in a way that mortgage bankers, brokers and thrifts collected a fee for originating loans, but at the same time they also transferred loans to the GSEs. The issuers of these securities then assumed the credit risk on the mortgages.(Ladd, 1998). In many cases the originator of the loan did not end up servicing the loan he had originated. Thus one can assume that the discriminatory incentives of the originator have changed, as not only he is rewarded for the maximum amount of mortgages he can approve, but is also stripped of any responsibility in case of default. Discriminatory practices have thus evolved and adapted to the changes of the mortgage market, and have not disappeared as other papers have suggested.

The rapid expansion of the secondary mortgage market and the financial deregulation in the 1980's that allowed smaller scale banks and thrifts to merge and broaden their activities lead to the

massive development of banking institutions. As certain banks reached a national scale and were competing in a market of multiple financial products for millions of customers, centralized databases and data-processing facilities were hugely invested in. 'As a result this shifted the informational basis of loan making from personal knowledge to standardized assessments.' (Dymski, 2013) This is another aspect in the evolution of the mortgage market that has blurred discriminatory incentives. The way unequal treatment takes place has evolved parallel to the transformation of the mortgage market.

In the past mortgage lenders were clearly discriminating against specific borrowers and in part that was the result of policy guidelines. Documents prove that mortgage originators during the 1970's, often discounted a wife's income by almost 50% during the evaluation process of the mortgage. As mortgage originators use a formula that takes into consideration a combination of variables such as income, and believe that the percentage of family income spend on housing is an essential determinant of loan risk, by omitting a percentage of the wife's income, families are offered a much smaller loan, or none at all.

According to theory, lenders usually omit a major percentage of the wife's income as they assume them to be temporary workers. If the wife's income was to be counted as a whole when determining the percentage of income the family is able to spend on housing then in a case of childbearing, the family's ability to keep up with mortgage payments would supposedly be impaired. This economic justification for the wife's income being omitted is widely focused on, whenever advocates of equal rights for women speak up. Dennis Kendig, in his study on discrimination against women provides two reasons on why this economic justification does not in fact rest on any economic theory. "First, the probability of delinquency or default is not particularly sensitive to the percent of income devoted to housing expense. Second, the income of a working wife cannot in the majority of cases be expected to shrink or evaporate during the early years of the mortgage (Kendig, 1973). In fact several studies have proved that the percentage of family income spent on housing is

not a reliable determinant of the family's ability to pay off the loan. According to a study by John Herzog and James Earley for the National Bureau of Economic Research the most important factors taken into consideration when calculating the potential risk of a borrower is loan-to-value ratio (Herzog, Early 1970). In other words it not evident at all that the wife's income being calculated as a whole will increase the probability of default if the wife stops working Furthermore, studies have also shown that the assumption that the wife's income being terminated in the first years of the mortgage affects a substantial number of working women that do not plan on becoming mothers.

Pregnant households specifically faced a reduced access to mortgage loans and although there is not enough empirical research on the topic of family-structure discrimination, it is widely suggested that mortgage lenders were far more hesitant to approve loan applications of pregnant households. Kending's results do in fact show evidence pinpointing to the existence of widespread discrimination against women.

Currently, though the presence of discrimination should have been eliminated theoretically due to the different anti-discrimination bills and laws that have been established, such as the Equal Credit Opportunity Act (ECOA) (1974) and the Fair Housing Act of 1968. As mentioned before, the Equal Credit Opportunity Act made it illegal for "any creditor to discriminate against any applicant, with respect to any aspect of a credit transaction on the basis of race, color, religion, national origin, sex, marital status, age." The Fair Housing Act of 1968, prohibited discrimination in the sale, rental or financing of a house based on race, religion or sex. Furthermore, it seems that the bigoted mentality that ruled over the banking institutions and the mortgage market in general, has disappeared over the years, or it is not as easily expressed as it punishable by law. The changing structure of the mortgage market should also be considered, for reasons explained above, as 'lending institutions are unlikely to forego profits as the price of implementing discrimination' as they did in the past and as Becker's pioneering theory on discrimination suggests (Ladd, 1998). Thus, is it even plausible that banking institutions still discriminate against minorities? Despite the several anti-

discrimination regulations in combination with the civil rights movement, Moreover, wouldn't the development of the mortgage market in a mechanism that encourages loan originators to approve as many mortgages as possible practically blur the incentives for discriminating to such extent that it is almost unreasonable to discriminate against minorities? It seems that if bigoted lenders tried to deny housing loans to any minorities nowadays, they would be met with loss of profits in comparison to their competitor, and then be held accountable in a court of law. That unfortunately would only be the case in a perfect world.

Firstly, even though U.S legislation against discrimination has been widely supported and established is it unrealistic to expect that all cases of potential discrimination are being brought to light. Not all cases of potential mortgage discrimination are reported and the ones that are reported do not always end with the victim being justified. Furthermore, the desire for increased profitability, which came hand in hand with the development of the mortgage market (mortgage brokering became highly profitable during the 1990's and 2000's) gave rise to new types of discrimination and new incentives behind them. Discriminatory practices have evolved in ways that do not require profit-sacrificing motives to support them. Predatory lending and algorithm-based discrimination are examples of such practices. Furthermore, in many cases, lending institutions use the applicant's race as a cheaper screening process than the other more formal, established but more costly processes. Thus in a world of imperfect information this can be viewed as a legitimate profit-maximizing process. Even though screening processes have shifted nowadays from the mortgage broker's personal assessment of the applicant, to an algorithmic analysis of the applicant's variables, studies have found that discrimination is still very present. Professor Adair Morse said that 'the mode of lending discrimination has shifted from human bias to algorithmic bias'(Bartlett, Morse, 2019). His study found that certain pricing disparities between otherwise similar applicants are the result of algorithms targeting applicants 'who might shop around less for highly-priced loans, 'meaning minorities with not enough access to financial services who are forced to agree to any terms they are

first presented with. Finally the changing incentives of providing as many loans as possible have given a rise to another form of discrimination compatible with profit-maximizing, predatory lending.

In order to understand the role played by race in the mortgage lending decision, it is essential to first outline the process of acquiring a mortgage and then describe the economic factors that could possibly have an effect on that final decision. Securitization and the revolutions in the financial market have transformed this process. Until a few decades ago the process only involved the borrower applying for a loan from a conventional depository institution such as a bank or a savings and loans association and the lender's only responsibility was to decide whether to approve it or not and hold it until maturity. As the secondary mortgage market evolved, responsibilities and incentives were reshaped as well. New players emerged in the mortgage market and their incentives are not perfectly aligned with that of consumers, especially minorities. As previously mentioned the newly introduced mechanism rewards sales of high volumes of loans. The up-front fee mortgage loan originators receive, has resulted in an almost indifferent attitude towards the risk of borrowers defaulting. Investment banks and other institutions involved in securitization, engage in due diligence that is not designed to protect customers (Engel 2011). Thus there might be possible discrimination along the channel of acquiring a mortgage. This channel one has to go through to acquire a mortgage will be described below.

Mortgage Decision Making Process

When an individual applies for a loan which is classed as 'conforming', meaning it falls below the federally-set conforming loan limit, a process begins with the GSE, whereby the lender provides application observables such as the applicant's credit score, liquid reserves, income, debt-to-income ratio, property value loan-to-value ratio, , etc. into the GSE's 'black box'. This is an automated underwriter system using Desktop underwriter for Fannie Mae and Loan Prospector for Freddie Mac. Based on a specific set of observables, an 'accept or reject' decision is reached. If the

loan is accepted and actualized the mortgage is then sold to the GSE. The lender is compensated with a cash transfer. The loan is then packaged with a group of mortgages with a similar property value into a mortgage backed security (MBS), a default-risk guarantee is issued on the product and it is sold to the MBS market. For a period of 30 days the lender holds some credit risk but after that time the lender is not exposed to any pre-payment or default risk. He is however, exposed to put-back risk. This is when the documentation accompanying the loan such as the IRS form, credit score information or when loan purpose, for example, residential or commercial, is falsified or absent. After the financial crisis of 2008, 'because of put-backs and large fines for misrepresentation, lenders ceased no-documentation GSE loans and adjusted their policies to remove the potential for falsification' (Bartlett, Morse 2019).

Furthermore, within the GSE process the lender is faced with three important decisions regarding the pricing of the mortgage since the interest rate that is assigned to the potential homeowners is the product of several factors. Firstly, all mortgages face an identical market price to capital, which is determined by the Base Mortgage Rate. The BMR reflects the primary interest rate on all mortgages that are to be purchased by the GSE's. Essentially, the BMR "reflects the compensation demanded by investors in the MBS market"(Bartlett, Morse 2019). The second component that determines pricing is a 'guarantee fee' that is paid to the GSE's by the lenders to cover potential default and operational costs. The amount of this fee varies accordingly to the credit risk of customers across the GSE grid also known as the Loan Level Price Adjustments (LLPAs)

The rates that the originators are quoting have incorporated both the Base Mortgage Rate(reflected as the par rate) as well as the LLPA adjustments(reflected in the form of 'hit' to the par rate). The third pricing component that might affect quoting rates depends on the lenders competition environment of a location, since in cases of deserted financial environments lenders might follow a

monopolistic pricing. There have been numerous studies that reflect such practices where lenders specifically target customers with limited financial accessibility in order to quote higher rates. (Bartlett, Morse 2019).

Origination Channel

Loan originators such as depository institutions, mortgage banks etc. are the main bodies responsible for extending credit to borrowers. Nevertheless, loans can also originate through thrifts or smaller community banks. In the majority of scenarios “lenders reach out to potential customers, take mortgage applications, and underwrite and fund loans for those who meet their underwriting standards; once funded a retail loan may be held in a portfolio by the lender or packaged and sold on the secondary market”(Apgar 2005). Intermediaries between the borrower and the originator such as mortgage brokers are also usually involved. These brokers help borrowers acquire credit and can supposedly play a crucial role in matching them with well-termed loans. Since, mortgage products are of a certain complexity, it is reasonable that many consumers could potentially benefit from the services of such intermediaries. The issue is though, that most brokers do not act in the borrower’s interest. This is because their profit-maximizing incentives are not aligned with the interests of borrowers, meaning that brokers can maximize their personal compensation at the expense of the borrowers they represent. Brokers receive origination fees from the borrower at the time the loan is funded and are rewarded by the number of customers they have matched with lenders. Once they are compensated by the lender in the case of a successful loan, they lose all long-term interest in the performance of the loan. Thus brokers become immune to the potential consequences of their actions. Furthermore, lenders also benefit from using intermediaries, as they avoid direct involvement with the borrowers, which ‘insulates lenders from consumer litigation’ (Engel, 2011).

Mortgage originators are assumed to follow profit – maximizing incentives. In order for profit maximization to be achieved one would have to maximize the difference between the expected

return on the mortgage and the costs of the funds to a lender. The expected return on the mortgage depends on the interest rate charged and the probability the mortgagor defaults. As all mortgage applications are accepted at the market rate, it is evident that 'expected profit maximization depends almost exclusively on granting mortgages that minimize the probability of and costs to default (Munnell, Tootell, 1996). The probability of the borrower defaulting depends on a variety of variables such as personal characteristics and loan variables, which the mortgage lender considers in order to estimate the probability. Thus if one is to understand the impact of race in mortgage acquiring process one has to control for all variables in the lender's information set. Income years of education, size of the mortgage are all basic variables to be considered, and while they do affect the decision making process, there are other more technical variables that are more essential in such processes. Net wealth, liquid assets, housing expenses relative to income and total debt payment obligations relative to income are examples of such variables.

For a more descriptive and specific analysis of the origination channel, it is fundamental to look into the existing case studies of lenders. Specifically the Urban Institute has produced a detailed account of the origination process, based on one case study of a lender. In their study they look into the behavior of a lender, a mortgage company that is fully owned by a builder who develops housing for low- middle- and upper income households. This mortgage company operates in a large city with a substantial number of black and Hispanic residents, producing roughly 1000 mortgages per year valued at almost seventy million. The description of the process however is derived from the point of view of the actual lender and not of the Urban Institute. The process nevertheless is still scrutinized by the Institute.

All employees of the lender that were interviewed claimed that they are heavily committed to treating every customer fairly. They also claimed that it makes no sense from a profit-making and a business point of view to turn customers away. The lender however does not provide fair lending training to the employees and only includes a single paragraph describing fair lending guidelines in

their procedure manual. They have also been accused for discriminatory practices by minority customers in the past although the lender was never found to be liable.

In any case, the lender's origination process (figure 1) follows a 'team approach' in deciding the final result of an application in order to restrict any employee's power of deciding individually. According to the lender, 'a loan counselor, a processor, the branch manager, and the underwriter or president, use as much creativity as possible to qualify applicants (Turner, Skidmore 1999). Loan applications are also discussed in weekly meeting in the presence of several decision-making employees in order to discuss strategies that can potentially better the chances of marginal applicants qualifying.

The initial loan application process begins with the customer completing a hard-copy application in which they provide personal characteristics such as income, employment history, existing debts, and other relevant information. The loan counselor then enters the information into an electronic version of the form. This application also requires the applicants to declare their race and according to the lender's staff 'this information is never used in the origination decision process. It does however follow under the "disclosure information' category which is required by the loan counselors at the end of the initial application.

As the initial application interviews comes to an end the counselor requires the customer to provide seventy five dollars for his credit report and is told that they will be in touch after the credit report is examined. The research team of the Institute indicates that the loan counselors do not forecast potential results with the customer. Once the customer leaves, the counselors add comments on the digitalized version of the application regarding the customer's characteristics such as his income past employment, credit history etc. These comments according to the counselors do not allow for subjective feelings about the customer. Since they are accessible to everyone in the company they are mostly meant to provide information to the underwriter or the branch manager about any financial issues that might need attention. After the comments are added both the

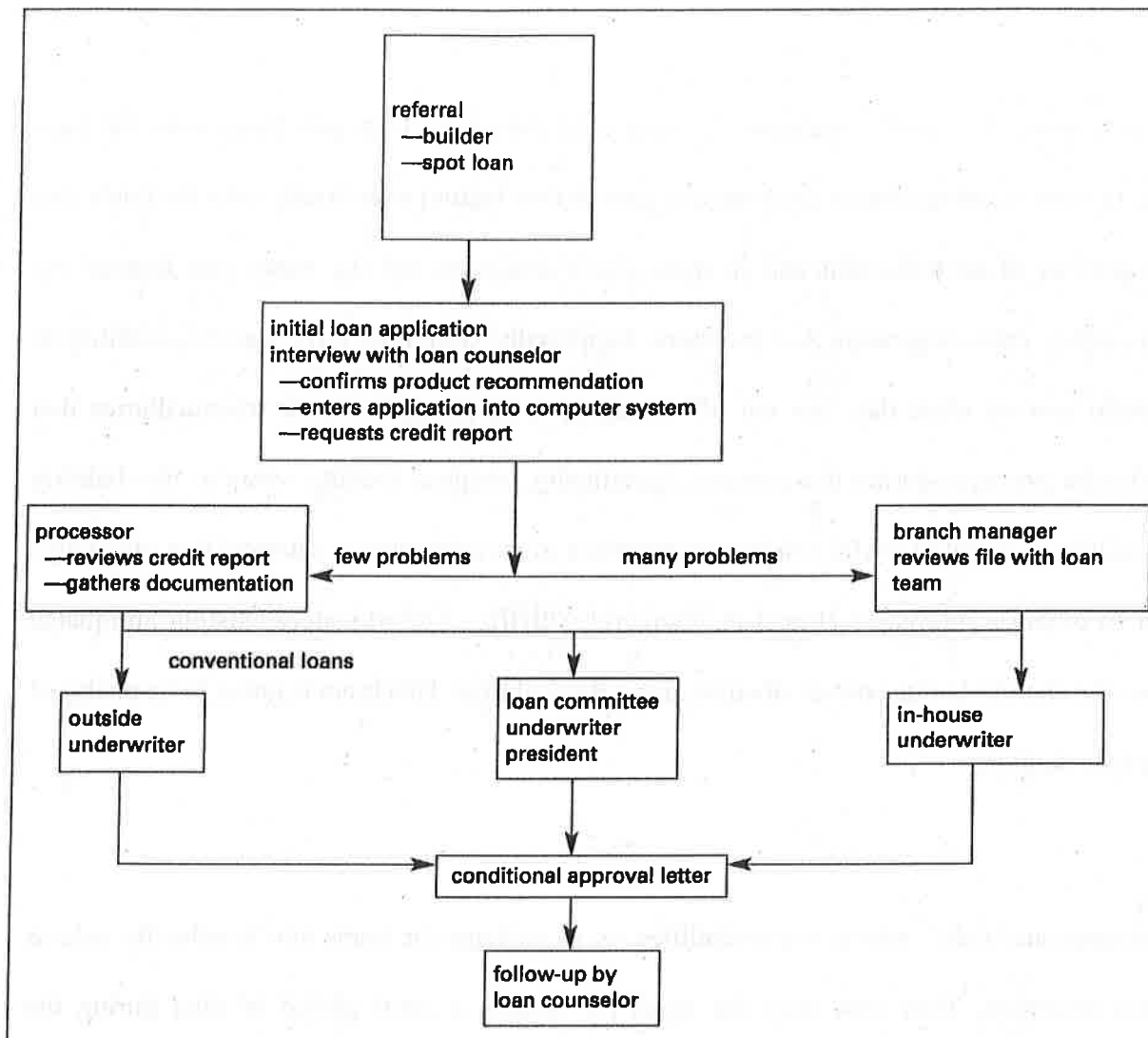
digitalized and the hard-copy of the applications are sent to a branch manager who collects all the available variables and secures the documentation that is useful before sending the application to the underwriter.

The underwriter of this mortgage company evaluates the application by personally examining all the relevant information of the file and not through an automated underwriting system like most of the underwriters use today. According to her own words she tries to apply the underwriting guidelines in the most flexible way possible. She also added that the applicant's race never enters into her decision making process nor that she possesses knowledge of what percentage of minorities have been approved for a loan. Nevertheless an individual underwriter is unable to dictate the final decision since 'all conditional approvals are transmitted by letters reviewed and signed by the president' (Turner, Skidmore 1999). It is evident thus that the final decision on whether the loan is to be approved or not is not the responsibility of a single individual but is rather a team based process that requires input from a number of different employees.

Almost three-quarters of the mortgages originated by the company have to follow the underwriting standards of the Federal Housing Administration (FHA), Veterans Administration (VA), and Farmers Home Administration (FmHA). This has a direct impact in the level of strictness these underwriting guidelines have to follow since these government administrations are much more flexible towards underwriting standards than conventional mortgages. Even though the aforementioned mortgage company does not service any of the mortgages it originates, it holds an incentive to underwrite using conservative guidelines, since they are responsible in case of the customer defaulting, for up to 4 months, in the case of conventional loans. The same applies for government loans, which are sold to the two GSE's, although the lender is only responsible for a month after the mortgage has been sold. The FHA furthermore audits a sample of mortgage files submitted to make sure that underwriters of the company indeed comply with its standards.

From the above description of mortgage decision making, one could possibly imply that the process has been transformed over the years in order to counter for any potential discriminatory practices. The afore-mentioned mortgage company for example, claims that discriminatory practices are countered through the introduction of a team-based approach in the decision-making process. On the other hand there are so many new agents introduced, both within the framework of mortgage originators, and also outside of it, as in the afore-mentioned case of mortgage brokers, who carry responsibilities not only related to the final approval of the mortgage but also to the specifics of the loan. Furthermore, the rapid expansion of the secondary market has introduced a number of additional agents as well, that can indirectly affect the decision making process. The specific roles and responsibilities of these agents are discussed below. (see Fig., 1)

Figure 1. Lender's origination process



(Turner, Skidmore 1999).

Agents of the Secondary Mortgage Market

Assignees

Assignees are the entities that own the loans after they have been purchased from the loan originators. In some cases assignees are arrangers (see further below) who briefly own the loans that are in the process of securitization and in most cases, assignees are the trusts that finance the securities issued to loan originators and investors. Supposedly, assignees have a certain liability in the origination process since they can cut off financing to loan originators or intermediaries that commit unlawful practices during that process. Specifically, assignee liability refers to 'the liability of owners of loans for any unlawful origination practices of an originator or intermediary who helps a borrower to obtain a mortgage' (Engel & Fitzpatrick 2010). Unfortunately existing antiquated laws such as the 'holder in due course' doctrine, limit this liability. This issue is going to be analyzed fully in my last chapter.

Arrangers

Arrangers are bodies whose responsibilities are to package the loans into bundles for sale as asset-backed securities. They only own the loans for usually a short period of time during the purchase of the loan and the point it's securitized. Their actions bear some exposure to liability in case they are found to be involved in unlawful activities during the origination of the loan. Even though there are only a small number of cases where arrangers have been found accountable for unlawful conduct, their role in discriminating or in participating in other similar activities is controversial. Is it in fact their responsibility to keep discriminatory practices or abuses out of the mortgage market even when they do not themselves participate in them? The controversy lies behind the fact that arrangers could possibly enable bad actors by 'funding them through loan purchases' (Engel 2010). They can also affect the process of loan origination by 'directly informing originators of the types of loans they are willing to buy and indirectly through the loans they actually purchase.'

(Engel & Fitzpatrick 2010). Arrangers could thus possibly play a role in enabling or participating in discriminating practices in the mortgage origination process. Consequently, as all these players are now involved in the process of mortgage origination it is possible that discriminatory practices exist in all levels of this process, or only in some.

The evolution of the mortgage market through the rapid expansion of the secondary market, has not only introduced new agents in the decision-making process but also new forms of discriminatory practices as well. The introduction of complicated variables and loan-specific terms that are not easily comprehensible by the average borrower, the fact that mortgage originators have of the option not to service the loan they originate, the relatively new role of arrangers in the secondary market in affecting the decision making process at the origination level, are all factors that have influenced the nature of discriminatory practices.

Modern Types of Discrimination

Predatory Lending

Over the recent years a new type of discriminatory practice has been created by lending institutions, 'predatory lending'. It is the most notorious form of modern discrimination in the subprime mortgage market. While subprime lending is not synonymous with predatory lending, such practices are rarely presented in the prime market (Renuart 2004), as "competition among lenders and greater standardization and simplicity of mortgage products" usually prevent it (Apgar 2005). However, identifying predatory lending practices has been observed to be relatively difficult since the secondary market is largely concerned with subprime lending. Subprime lending can be described as lending which 'serves the market of borrowers whose credit histories would not permit them to qualify for a conventional 'prime' loan (Lehe 2010).

The federal definition of predatory lending describes it as "engaging in deception or fraud, manipulating the borrower through aggressive sales tactics, or taking unfair advantage of a

borrower's lack of understanding about loan term"(US Department of the Treasury 2000). The terms on predatory loans are either outright deceptive or the fees the borrowers are subjected to, are usually disproportionate to the borrowers risk (Engel and McCoy 2002, Renuart 2004, FCIC 2011). Another definition characterizes predatory loans as 'a mismatch between the borrowers financial circumstances, needs and objectives and the loan that the professional lender offers' (Ehrenberg, 2001). Since there is not a universally accepted definition of predatory lending, some 'predatory' loan terms seem more affordable than others, it is important to note that the term predatory lending covers a vast variety of predatory practices. The Federal Deposit Insurance Corporation (FDIC) identifies the following as practices or terms that can potentially be predatory.

- (1) abusive collection practices;
- (2) large balloon payments due at loan maturity, which are accompanied by lower monthly payments to disguise the true cost of the loan;
- (3) encouraging borrowers to default on an existing loan in order to refinance all or part of it with a new one;
- (4) equity stripping schemes, in which the lender depletes the borrower's home equity by repeatedly refinancing a loan and applying new fees with each transaction;
- (5) loan fees in excess of the amount justified by the costs and risks involved;
- (6) interest rates in excess of the amount justified by risk-based pricing calculations;
- (7) fraud, deception, and abuse, which may include "inflating property appraisals and doctoring loan applications and settlement documents";³⁶
- (8) high loan-to-value ratios, which "effectively prohibit homeowners from selling their homes" or filing bankruptcy "without losing their home";³⁷
- (9) lending without regard to borrower's ability to repay, also known as asset-based lending;³⁸
- (10) loan flipping, in which mortgage originators refinance loans
- (11) mandatory arbitration clauses that prevent predatory lending victims from suing for damages;
- (12) pre-payment penalties;⁴¹
- (13) refinancing special subsidized mortgages that are favorable to borrowers with loans that offer borrowers less economic benefit;
- (14) refinancing unsecured debt, such as credit card or medical debt, using a borrower's home as collateral;⁴²
- (15) single-premium credit insurance, which requires the borrower to pay the total premium upfront as an additional amount financed in the loan, thus raising the amount of interest paid;
- (16) spurious open-end loans⁴³ that permit lenders to circumvent statutory disclosure requirements for closed-end credit, including HOEPA restrictions discussed in Part II.A *infra*, and borrowers' right of rescission;
- (17) "steering" borrowers who qualify for lower-cost prime loans to high-cost subprime loans; and
- (18) yield-spread premiums that lenders pay to mortgage brokers "based on the difference between the actual interest rate on the loan and the rate the lender would have accepted on the loan given the risks and costs involved,"⁴⁴ which incentivize mortgage brokers to steer borrowers to higher cost loans.

According to Engel and McCoy, who grouped these predatory lending practices according to the different impact they can impose on consumers, predatory loans can fall under these categories.

'1) *Loans structured to result in seriously disproportionate net harm to borrowers.* 2) *Harmful rent seeking.* 3) *Loans involving fraud or deceptive practices.* 4) *Other forms of lack of transparency in loans that are not actionable as fraud.* 5) *Loans that require borrowers to waive meaningful legal redress.*' (Engel, McCoy, 2002).

The list provided by the FDIC, combined with the categorizations made by McCoy illustrate the numerous manifestations of predatory lending; the inherent complexities of the mortgage products that arose from the recent development of the mortgage market have provided numerous opportunities to lenders to exploit borrowers on the basis of increasing their financial gains. Furthermore, these lists showcase the inherent difficulty in enforcing anti-predatory legislation since the creativity of lenders in innovating varieties of predatory practices is apparent, something that is going to be analyzed fully in my third chapter.

As mentioned above predatory practices are based on the assumption that certain financial terminology is too complex for everyone to grasp. It seems however, that predatory practices specifically target minority populations. Evidence has made it abundantly clear that the practice of 'reverse redlining' or in other words 'the targeting of African-American and Latino communities in particular, for the marketing of subprime and predatory loans', was a huge aspect of the expansion of the subprime lending (Lehe, 2010). The predatory lenders targeted minorities since throughout the years they were stripped of equal housing opportunities and consisted of an easier 'target' due to their higher probability of accepting the loan.

More specifically according to Canner in 1998, 'subprime and manufactured housing lenders made up a fifth of all mortgages extended to lower – income and Latino borrowers, and a third of all those made to African – American borrowers' (Canner, 1999). A study of HDMA data by Bradford (2002) resulted in African – Americans being twice as likely as whites to receive subprime loans, while Hispanics were almost one and a half times more likely than whites. It is suggestive therefore, from the above studies that minorities are in fact targeted through predatory lending. Nevertheless most research and writing on this matter remains inconclusive, as academic research on predatory lending is just emerging.

The predatory lending market can be described as a 'push market' where lenders usually look for specific customers, rather than wait for customers to look for mortgages on their own (Renuart 2004). Kellie Kim-Sung and Sharon Hermansons' study (2003) on the dual mortgage markets support this claim. Their results show that 56% of the customers involved in broker-initiated mortgages had been initially approached by a broker while only 24% of borrowers reported they initiated contact themselves. They also found that 'a higher share of broker-originated loans go to African American borrowers (64%) than to white borrowers (38%), and broker-originated loans are also more common among borrowers who are divorced or female. Furthermore, borrowers involved in broker-originating mortgages are more likely to pay extra points and more likely to receive a loan with a prepayment penalty. It is evident nevertheless that the role of brokers is specifically important. This role is analyzed further below.

Engel and McCoy argue that a lender's ideal target group is people disconnected from credit markets who are generally uninformed about the best available products in the market. Creditors targeted specific neighborhoods and demographic groups; unsuspected borrowers who they knew could not possibly handle any future payments (Renuart 2004, FCIC 2011). Several 'push' tactics that were employed by lenders included, door-to-door solicitation among minorities and the elderly, the exploitation of community institutions such as churches to acquire potential customers and subprime refinancing with loans much greater in amount than necessary (Renuart 2004; Powell 2009; Hernandez 2012). Minorities were particularly targeted, since they have historically been denied equal housing opportunities and were thus especially vulnerable to any potential 'offer'.

It is evident therefore, that there is a dual mortgage delivery system, which specifically targets low -income minority consumers. These borrowers are offered specially tailored products and mortgage lenders that are different than the credit sources available in higher - income markets. (Apgar 2005) These different products often contain stricter terms than the prime loans in the

mainstream market, and these alternative mortgage originators are usually excluded from the existing regulatory framework.

Algorithmic Based Discrimination and Statistical Discrimination

The idea that discrimination can occur even through the use of algorithm-based computer programs was briefly mentioned before and is going to be analyzed in depth below. Robert Bartlett's and Adair Morse's study on this matter has provided insightful results and portray very important knowledge on how algorithms are utilized in the mortgage market. In their effort to estimate the level of discrimination their results showcase that the FinTech companies which used algorithmic based loan origination are equally discriminatory towards minorities when compared to face-to-face lenders. This is an important finding since the involvement of algorithms in the decision making process or in the underwriting process supposedly decrease the probability of human biases affecting these processes.

It is widely known that all different variations of consumer loan originations in the US are becoming largely algorithmic. An evident example of this is the Rocket Mortgage of the platform lender 'Quicken', the largest-volume mortgage product in the U.S. as of 2018. As mentioned before this changing nature in the mortgage decision-making also affects the nature of discrimination in the mortgage market. Discrimination is no longer concerned with bigotry and prejudice but with illegitimate applications of statistical discrimination. Even if lenders do not have any racist feelings towards their minority customers they can produce a disparate impact through the use of proxy variables. Identifying illegitimate statistical discrimination however, in the modern era of algorithmic-based mortgage decision-making is a controversial matter since potential evidence can always be a product of an omitted variable (Bartlett, Morse 2019). 'Legitimate' statistical discrimination can arise since "some variables in a macro-fundamental model of repayment risk are not observable" and by using observable proxies the lender can almost reconstruct the hidden

information. Specifically, lenders use proxy variables that reproduce disparate impact only if these variables have a 'legitimate business necessity'. The legitimate-business-necessity defense is very common among lenders accused of participating in discriminatory practices. Thus in order to identify illegitimate applications of statistical discrimination where the use of proxy variables is not supported by a legitimate business necessity, it is important to first outline what constitutes legitimate uses of statistical discrimination and what does not.

Robert Bartlett describes three distinctive applications of statistical discrimination. '1) *Scoring or pricing loans explicitly on credit risk macro- fundamental variables is legitimate.* 2) *Scoring or pricing on a Big Data variable that only correlates with ethnicity through hidden fundamental variables is legitimate.* 3) *Scoring or pricing on a Big Data variable that has residual correlation with ethnicity after orthogonalizing to hidden fundamental credit risk variables is illegitimate.*' (Bartlett, Morse 2019). In other words, using proxy variables to estimate the credit-worthiness of the applicant, that are both correlated with ethnicity and with credit risk, is a legitimate use of statistical discrimination. However, using proxy variables to price loans that are correlated with ethnicity but not with the risk of defaulting, is an illegitimate application of statistical discrimination. For example, using the high school of an applicant as a proxy variable that predicts his hidden wealth, where wealth is correlated with the endowment variable in a credit-risk setting, might produce disparate impact since high school is also correlated with ethnicity. Thus from a researcher's point of view, identifying illegitimate statistical discrimination requires a setting where all legitimate business necessity variables are observable in order to successfully identify discrimination. (Bartlett , Morse 2019).

Their results were alarming. They found that Latin and African American ethnic groups are offered much stricter terms in mortgage loans when compared to their white counterparts. Specifically, ethnic groups "pay a higher (5.6 bps) interest rate for purchase mortgages and about a 1-3 bps higher mortgage interest rate for refinance mortgages." Surprisingly the results also present

the fact that FinTech leaders discriminate at the same level when compared to traditional face-to-face lenders (Bartlett, Morse 2019).

Chapter 3

Policy Review

Measurements to Counter Algorithmic Discrimination and Disparate Impact

Mortgage discrimination practices have thus been transformed over the years as well as the incentives behind them. Existing legal doctrine has been unable to keep up with the changes of the mortgage market as it primarily challenges human prejudice in setting credit terms and provides little to no insight on how to monitor the sophisticated statistical decision making process of today. The few measurements that are concerned with the algorithmic decision-making process do not in fact affect the existing pricing disparities. The specifics of this notion will be analyzed below.

One very important tool of anti-discrimination policies is restricting the impact of certain types of variables from the decision making process (Gillis, Spiess 2019). Typical protected characteristics involve race and gender, and are not to be involved or used in the setting of the prices since their use can easily produce disparate impact. Indeed several policies rely on the exclusion of certain variables to prevent discrimination. The ECOA specifically states that “Except as provided in the Act and this part, a creditor shall not take a prohibited basis into account in any system of evaluating the creditworthiness of applicants.” The FHA specifically prohibits discrimination in housing based on the race, gender, national origin etc.³

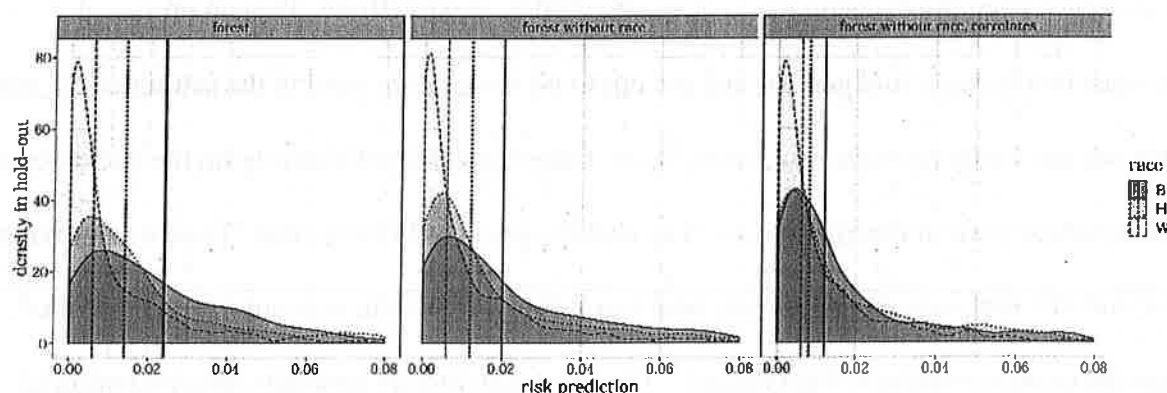
Although the variable exclusion is a central aspect of discrimination laws, enforcing it can be difficult when the forbidden variable is physically observable to the decision maker. When a

³ 12 CFR § 1002.6

mortgage broker for example physically observes the potential borrower's race it is almost impossible to conclude that the racial variable did not affect the decision-making process. Thus the perceived advantage of an algorithmic decision making process is that it actually excludes protected characteristics from the process. While this automated pricing produces increases transparency it also comes with serious limitations. Studies have shown that the inclusion of forbidden variables will actually decrease disparity, “particularly when there is some measurement bias in the data” (Gillis, Spiess 2019), and that the exclusion of a protected variable such as race from fitting the algorithm has little to no effect to how the projected risk changes.

Theoretically the exclusion of a protected characteristic from the decision making process would cancel any direct effect of such characteristic to the process. One would hope for example, that excluding race from the algorithm reduces possible disparity in risk assessments between race groups. Unfortunately this is not the case.

FIGURE 1: DISTRIBUTION OF RISK PREDICTIONS ACROSS GROUPS FOR DIFFERENT INPUTS



The above diagram (Gillis, Spiess 2019) illustrates that disparities can persist even if protected variables are excluded from the algorithmic decision making process. Figure two represents the probability function of the predicted default rates. The middle graph reflects the distribution of the forecasted default rates when race is excluded from the algorithm. The graph on the left illustrates the distribution of the predicted default rates as created by “using the decision rule that included the

group identity as an input". It is evident that even if race is excluded from the algorithmic decision making process, pricing disparities persist.

This is the case as there is the possibility of other variables that are correlated with race existing and affecting the decision making process even after the variable of race itself is excluded. If for example applicants of one group happen to have obtained fewer years of education on average, then using education in the decision making process will result in different prices among the different groups. The problem of the excluded variable being reconstructed from a combination of other variables is especially evident in high-dimensional data sets where 'complex, highly non-linear prediction functions are used (Gillis, Spiess 2019).

A potential solution to the problem of the protected variables having an indirect effect to the decision making process would be to drastically expand the criteria surrounding input restrictions. If other correlating variables are also excluded then this indirect effect might decrease. For example if an applicant's education is highly correlated with his race then one would maybe want to exclude years of education from the decision making process. Even though education is not directly correlated with default rates, it has been used as a proxy for future profitability that has affected the mortgage lending decision. A serious limitation to this solution though is the fact that there might be several variables that are indeed correlated to race, but cannot be excluded as they are also correlated directly to the probability of the applicant defaulting. One could possibly suggest that the only variables that should be excluded should be the ones that are not logically connected to default rates, but that solution has limitation itself, as there are almost countless variables that might be correlated to default rates, and not all of them can be observed (Gillis, Spiess 2019).

Furthermore, it should also be considered that the actual effectiveness of excluding other variables that are correlated with race to decrease potential pricing disparities is insignificant. The figure on the right reflects the probability of default rates as calculated without taking into consideration race and the ten most significantly correlating variables. It is evident that even after

excluding such variables pricing disparities still persist. In Big Data therefore, 'even, excluding those variables than individually relate most to the 'forbidden input' does not necessarily significantly affect how much pricing outputs vary with say, race' (Gillis, Spiess 2019).

Disparate impact in United States labor law refers to 'practices in employment, housing, and other areas that adversely affect one group of people of a protected characteristic more than another, even though rules applied by employers or landlords are formally neutral' (Gillis, Spiess 2019). Even though the definition of disparate impact has been associated with unintentional discrimination, it is unclear if its purpose is to deal with claims of discrimination where intentions are really hard to identify or with claims where there were no intentions to begin with. Furthermore, there have been several studies that have suggested that disparate impact is not only a theory of discrimination, but also a tool or a proxy that contributes in identifying disparate treatment, the practice of discrimination that results from intentional actions. According to the Supreme Court in the case of 'Texas Department of Housing & Community Affairs v Inclusive Communities Project', "Recognition of disparate-impact liability under the FHA plays an important role in uncovering discriminatory intent: it permits plaintiffs to counteract unconscious prejudices and disguised animus that escape easy classification as disparate treatment." (Gillis, Spiess 2019)

Furthermore, biased variables also pose a serious limitation when trying to understand the existing pricing disparities. A variable can be biased if it has been involved in some measurement error, or it has become biased through the years because of historical bias (Gillis, Spiess 2019). A simple example would be that one's income could possibly be correlated with race and gender because of previous discrimination in the labor market, and one's credit history might have been impacted by past discrimination in the credit market. In the case of a biased variable it would be undesirable to exclude a protected variable since the inclusion of that variable may force the algorithm to correct for the biased variable. For example credit scores have been criticized in the past since they have been viewed as a more predictive measurement for certain groups while 'overlooking

indications of creditworthiness that are more prevalent for minority groups' (Gillis, Spiess 2019). One reason why this is occurring is because credit rating agencies discriminate between means of acquiring credit, meaning that they favor customers that have received credit from mainstream lenders such as depository banking institutions. Minority borrowers however tend to acquire credit from financial institutions which are not considered 'mainstream lenders' and such a credit line might be treated less fairly by credit rating agencies. In other words, 'the credit score may reflect the particular measurement method of the agency rather than underlying creditworthiness in a way that is biased against minorities' (Gillis, Spiess). If this is in fact the case, and the credit scores of minorities are not considered of equal weight because they result from alternative lines of credit, then a lender that uses credit score as a predicting variable for default would want to include race as a variable as well, in order to distinguish credit scores among different ethnic groups, and in order to provide equal weight in credit scores in the decision making process among different groups. Of course including 'forbidden' variables in the algorithmic decision making to decrease discrimination practices is a contradicting matter since the inputs are basically affected by disparate treatment and the outputs by disparate impact. In the setting of algorithmic credit pricing though, 'including forbidden characteristics could potentially allow for the mitigation of harm from variables that suffer from biased measurement error' (Gillis, Spiess 2019). To conclude, despite potential weaknesses, the introduction of algorithms in the decision making process of acquiring a mortgage has produced incredible transparency when compared to the human-based decision making of the past, as it provides automated pricing, existing legislation that prohibits the use of protected variables from the decision making process will have little to no effect in reducing existing pricing disparities.

In the past, and specifically during a period shortly before the 2008, crises, there were a number of cases where minorities agreed on much higher interest rates than the one set at the 'par rate' by the mortgage originator (*Miller v Countrywide Bank*, *Martinez v Freedom Mortgage Team*) The argument behind this was that discriminatory pricing occurred as a result of the discretion given

to the mortgage brokers that were involved in the decision making process in setting the final terms. In other words the mortgage originators determined the 'markup' added to the 'par rate'. In none of these cases though were the mortgage brokers themselves scrutinized or personally blamed. They were treated more as a 'black box'. The courts did not directly examine the process where the discriminatory decisions actually occurred but rather focused on the mortgage originator's discretion policy. It is unknown if pricing disparities occurred as a result of the mortgage brokers decision to charge higher interest rates to minorities, specifically because they physically observed their race, or whether it was the result of disproportionate weight being placed in variables correlated to race, such as the neighborhood of the borrower. In either case it is impossible to understand the nature of these discriminatory decisions since it is difficult to revisit exact decision making processes and parameters that occurred in the past (Gillis, Spiess 2019). To overcome this obvious limitation, and the inherent difficulty in recovering the 'whys and wherefores' of the particular decision that may have been discriminatory, courts focus on means to facilitate discriminatory decisions, rather than scrutinizing the decision-makers themselves. This limitation often forces the courts to generally condemn the discretion given to the brokers as causing price disparities (Gillis, Spiess 2019).

Unlike in the human decision making process though, algorithmic based procedures theoretically be deconstructed. There is almost complete transparency on what specific decision caused the disparity, since theoretically the decision making process can be recovered. One possible way would be to examine the specific variables used by the algorithm similar to examining coefficients in regressions. To be more specific, the decision rule of the algorithm can be inspected in order for the most important variables to be identified. Furthermore, the construction of the decision rule itself, can also be inspected in order 'to measure which variables were instrumental in forming the final rule.' One other possible measure to monitor the presence of discriminatory incentives in the algorithmic procedure would be to report and compare the mortgage specific details that are produced by the 'Black Box' to what is actually later underwritten and assigned by the mortgage

broker as a result of his discretion. In cases where there is a clear difference between these two sets of mortgage specific characteristics, one could assume that the differences are products of discriminatory incentives on the part of the mortgage broker.

Measurements to counter Predatory Lending

Existing Federal legislation that counters predatory lending has been proved to be too inflexible, and as a result unable to keep up with the lender innovations in predatory practices. Existing anti-predatory laws have been unable to eliminate predatory lending, a fact which is attributed to two factors. Firstly, existing definitions of predatory-lending practices are not broad enough to allow for a case-by-case assessment of the suitability of the mortgages for borrowers, which leaves room for predatory lenders to innovate the means of conducting predatory practices. Secondly, existing, antiquated legislation such as the 'holder in due course' doctrine and the 'due equity' requirement prevent borrowers from being justified in the court of law (Lehe, 2010). All of the afore-mentioned factors are going to be fully analyzed further below.

Major Federal Anti-Predatory Lending Loans: RESPA, TILA, HOEPA

The *Truth in Lending Act (TILA)* was firstly enacted in 1968, to require 'meaningful disclosure of credit terms.' It protects customers against inaccurate and unfair credit billing and requires lenders to provide loan cost information so that the borrowers can 'comparison shop' for specific types of loans. Under TILA, home mortgage borrowers have a right of rescission, a three-day period where they can reconsider their decision, overview the loan specific terms and back out of lending deal without losing any money. The three-day period is given to counter 'high-pressure sales tactics used by unscrupulous lenders' (Lehe, 2010). If the borrower does in fact decide to rescind, then the originating lender or the current assignee must 'void' the mortgage, meaning that they need

to refund any amount paid by the borrower within twenty days of receiving the rescission notice. Furthermore, under TILA, lenders can be found guilty of predatory practices.

There are however, several loopholes that limit TILA's ability to protect consumer interests. Firstly, the Act does not require lenders to reveal costs that are related to 'credit reports, appraisals, document preparation, title searches and insurance, notary and recording fees and even taxes (Lehe, 2010). In other words lenders can disguise the real cost of consumer loans. Secondly, the one-year statute of limitations does not allow borrowers to be remedied for undisclosed loan terms that go into effect after one year. For example, borrowers would not be able to be remedied against lenders who did not disclose properly the terms of adjustable rate mortgages, a mortgage loan with an interest that adjusts based on 'an index which reflects the cost to the lender of borrowing on the credit markets'(Lehe, 2010) mortgages that frequently produce higher interest rates after one year. Borrowers that manage to overcome the statute of limitations nevertheless have to prove that they detrimentally relied on the lenders disclosure. Borrowers that do not read the entire disclosure statements will be unable to 'establish the required causal link between erroneous disclosure and their actual damages' (Lehe, 2010).

The Real Estate Settlements Procedure Act (RESPA) was passed in 1974, and its purpose was to 'aid the borrower or lessee in understanding the transaction by utilizing readily understandable language to simplify the technical nature of the disclosures.'⁴Under RESPA, any mortgage loan transactions must conspicuously and clearly include all the costs that are faced by the borrower and all the charges faced by the lender in connection to the transaction. Specifically, 'such forms... shall indicate whether any title insurance premium included in such charges covers or insures the lender's interest in the property, the borrower's interest, or both.'⁵ Furthermore, RESPA requires lenders and mortgage brokers to provide a 'good faith' estimation report of loan costs during the three days of the application and a detailed report of the actual costs at closing. RESPA

⁴ 12 U.S.C 2603-04

⁵ 12 U.S.C 2603-04

measurements such as the afore-mentioned however, are essentially ineffective since the lenders or brokers are not actually held accountable in case of failing to provide 'good faith' estimations. Finally, RESPA does not require lenders to inform borrowers of their right to proofread the final reports of costs at closing.

The most important federal regulation that directly addresses predatory lending is the Home Ownership and Equity Protection Act (HOEPA). It was enacted in 1994, as an amendment to TILA to address reverse redlining predatory practices. For loans that fall under HOEPA, certain lending practices and loan terms are prohibited. Examples include but are not limited to 'higher interest rates after borrower default, certain balloon type payments, negative amortization, making more than two advance payments to borrowers from proceeds of the loan, and extending credit without regard to the payment ability of the consumer'. HOEPA also addresses the issue of asset-based lending, where the lender approves the loan based on the asset value of the home rather than the borrower's actual ability to repay it, by requiring the lender to include 'current and expected income, current obligation and employment.'⁶ Most significantly, under HOEPA the 'holder due course' doctrine is abrogated, for loans that fall under the HOEPA umbrella, a significance which is going to be analyzed fully below. Any abrogation under HOEPA is noteworthy since the Act preserves the borrower's claims against mortgage originators or current assignees unless the afore-mentioned parties can prove that a 'reasonable person' would not have realized that the loan falls under HOEPA requirements.

Unfortunately, the afore-mentioned HOEPA protections are limited since the Act only covers a narrow scope of loans. The Act applies only to 'high-cost' home equity loans and does apply to the most common types of mortgages such as 'reverse mortgages', purchase money mortgages⁸, or

⁶ 15 U.S.C 1639

⁷ 'With a reverse mortgage, a lender makes payments to the borrower from its home equity and subsequently recovers the loan principal plus interest upon the borrower's sale of the home. About Reverse Mortgages for Seniors, U.S. Dep't of Hous. & Urban Dev., <http://www.hud.gov/offices/hsg/sfh/hecm/hecmabou.cfm> (last updated Jan. 5, 2007)

⁸ 'A purchase money mortgage is "[a] mortgage executed to secure the purchase money or a part thereof by a purchaser of property, contemporaneously with the acquisition of the title thereto, or afterward, but as a part of the same transaction." Ballentine's Law Dictionary 1027 (3ded. 1969)'

open lines of credit⁹. Specifically in order for the HOEPA restrictions to be enabled, the interest rate points or fees of the loans must surpass the existing HOEPA threshold.¹⁰ Engel and McCoy make it clear that this threshold is exceedingly high and does not cover the majority of predatory loans, since HOEPA has 'has strong proscriptions but at best covers (only) the costliest five percent of subprime home loan' (Engel, McCoy, 2007) Thus, lenders are able to exercise predatory lending practices in loans that are not covered by HOEPA.

External Barriers to Existing Legislation: The "Do Equity" Requirement and the "Holder in Due Course" Doctrine

Victims of predatory lending who try to defend their case of foreclosure under existing anti-predatory lending laws are usually met with external barriers, not including statutory requirements. Borrowers who try to redeem themselves financially in the court of law during foreclosures are usually met with the antiquated 'do equity' requirement, which obliges them to provide the full amount of their debt to their debtor, before the court hears their 'equitable challenge.' Furthermore existing law governing financial instruments such as mortgages limits the borrower's claims of predatory lending. Specifically, borrowers who claim to be victims of predatory loans are limited by the 'holders in due course' doctrine, which protects the assignee that currently holds the mortgage. Furthermore, the 'assignment' of the mortgage also protects the originator from any possible suit against him. (Lehe, 2010)

The fundamental rationale behind the 'do equity' requirement is that "one who seeks to avoid the provisions of the written instrument must stand ready to discharge the implied obligation of repayment of the sum borrowed, plus the lawful rate of interest."¹¹ In other words, 'one who seeks

⁹ 'Open lines of credit, or a home equity line of credit, is "a form of revolving credit in which [a] home serves as collateral." What You Should Know About Home Equity Lines of Credit, Bd. of Governors of the Fed. Reserve Sys.'

¹⁰ 'HOEPA requirements are triggered if the APR on the loan exceeds the yield on comparable Treasury securities by more than ten percentage points, or if total points and fees paid at or before closing exceed the greater of 8 percent of the total loan amount or \$400. 15 U.S.C. 1602(aa)(1) (2006).'

¹¹ Mich. Mobile Homeowners Ass'n v. Bank of the Commonwealth, 223 N.W.2d 725, 729 (Mich. Ct. App. 1974)

equity must do equity'¹² as well. This requirement applies to foreclosure cases since they are naturally equitable.¹³ Courts thus will not respond to a foreclosure claim, even if the borrower claims that the foreclosure is a result of predatory practices unless the borrower pays the full amount of the debt to the current owner of the mortgage. Thus, practically any borrowers who face foreclosure as a result of predatory loans are prevented from bringing their challenges into the court of law. The requirement essentially obliges them to pay the full outstanding debt (principal + interest) something that is almost always impossible. If the borrowers were able to pay the full outstanding debt they would have not defaulted on their loans in the first place. Some borrowers manage to 'do equity' by refinancing on their mortgage with a new loan, a practice which is logically very risky. Borrowers who face foreclosure are not very likely to find another lender willing to finance their loan with favorable terms, and even if they do, they run the risks on coming up against another 'predatory' lender. Finally, another major limitation that borrowers meet in foreclosure is the difficulty to identify the exact liable agent that initiated the predatory lending practice. The securitization of home mortgages creates a 'horizontally segmented lending process in which the tasks of funding, originating, serving, and holding mortgage loans are performed by legally unrelated business entities' (Hauser, 2008). Securitization thus requires the assignment of the mortgage to another entity after the process of the origination and mortgage loans are universally assigned (Hauser, 2008).

The assignment of the mortgage to another entity strips the assignee from any real liability since the mortgage note is considered to fall under the 'holder in due course' doctrine. This antiquated piece of legislation applies to negotiable financial instruments such as mortgages and protects the current holder of the mortgage from any liability associated with the origination process of the mortgage and the predatory practices that might have occurred during that. Any existing state anti-predatory and federal regulations do not apply to assignees since they are shielded by this

¹² Dickson, Carlson & Campillo v. Pole, 99 Cal. Rptr. 2d 678, 685 (Ct. App. 2000) (quoting 2 John Norton Pomeroy, A Treatise on Equity Jurisprudence As Administered in the United States of America

¹³ California Mortgages, Deeds of Trust, and Foreclosure Litigation, paragraph.3.12

doctrine. Specifically, the 'holder in due course precludes' the borrower from any relief, by 'shielding the assignee of a negotiable instrument from most claims and defenses to payment that a borrower could assert against the [assignor]' (Hauser, 2008). In most cases where the borrower tries to seek justice under existing anti-predatory legislation, the originator of the loan has already vanished or is insolvent, and the 'holder in due course' doctrine protects the current holder of the mortgage from being criminally prosecuted. In such cases borrowers are left without a legal recourse. Essentially, borrowers trying to assert their claims under existing anti-predatory laws are unable to seek justice, since the interaction of these laws with 'holders in due course' doctrine produces a legal framework under which any current holder of the mortgage note is heavily protected. As discussed above, the only mortgages that do not fall under the 'holder in due course' doctrine are the ones that fall under HOEPA. Unfortunately though, HOEPA only covers 5% of the most costly mortgages and its abrogation of such doctrines is too limited to ensure that all victims of predatory lending practices will be able to seek justice in the court of law.

Existing anti-predatory laws have been unable to eliminate predatory lending, largely because they are too inflexible and under-inclusive or too specific; current definitions of predatory lending practices are not broad enough to allow for a 'case by case evaluation of the mortgage's suitability for individual borrowers,' which leaves room for predatory lenders to create the means of conducting predatory practices. In other words anti-predatory laws have developed in ways that are too inflexible to adapt to the ever-evolving mortgage market (Lehe, 2010). Existing definitions of predatory-lending practices allow for lenders to create mortgage products that are excluded from the scope of federal legislation. Furthermore, existing antiquated legislation such as the 'holder in due course' doctrine and the 'do equity' requirement prevent borrowers from being justified in the court of law since they are either unable to pay the full amount of debt or because their mortgage originator is insolvent and the current holder of the mortgage is protected from any potential liability.

In order for the afore-mentioned shortcomings to be addressed, several measurements should be taken. Firstly, a more flexible standard describing lender misconduct in the mortgage lending market should be provided. Specifically, Congress should establish a 'lender suitability duty of care', a doctrine that is already established in several other financial markets. Applying this doctrine to the mortgage market would place a 'fiduciary duty' upon mortgage brokers and lenders to potential borrowers, similar to the fiduciary duty that is owed to investors by broker-dealers. In the context of the securities market, 'broker-dealers have a duty to deal fairly with their customers and to provide investment advice that is suitable to the needs of the investor' (Ehrenberg, 2001). This doctrine requires brokers – dealers to make sure that their customers can cover their trade, and has "evolved into a doctrine to protect investors from having broker-dealers either make or persuade investors to make inappropriate investments' (Ehrenberg, 2001). If applied to the mortgage lending market this doctrine would function as a federal anti-predatory measurement, flexible enough to counter any potential innovations of the predatory practices.

To battle the limitation that is faced by borrowers because of the 'do equity' requirements, Congress should pass legislation that limits the application of the 'do equity' requirement in cases of judiciary foreclosures where the borrowers claim to be victims of predatory loans. This can be a difficult to establish, since the claims by the borrowers of being victims of predatory loans cannot be proved until the matter is heard in a court of law. Nevertheless, a type of threshold on mortgage parameters can be established which, if compared to the financial situation of the victimized borrower, can produce an almost transparent image of whether the borrower is actually a victim of predatory loans, before an official court hearing. Thus, in such cases the 'do equity' requirements should be abolished.

Finally, Congress and the FTC (Federal Trade Commission) needs to pass legislation that completely abrogates the 'holder of due course' requirement from all mortgage assignments. This measurement will increase the 'assignee's liability' of any predatory practices that occurred during

origination, even if the originator has vanished or is insolvent. An abrogation as such, would force assignees to actually cut off financing to loan originators or intermediaries that commit unlawful practices during the origination process since their liability is no longer protected by the 'holder of due course' doctrine.

The Mortgage Reform and Anti-Predatory Act of 2009

In the wake of the 2008, financial crises, Congress has applied a certain type of duty to mortgage lenders. The Mortgage Reform and Anti-Predatory Act of 2009, which was passed as amendment to TILA in May 2009, established a 'federal duty of care'¹⁴ for mortgage brokers and originators. This Act required mortgage originators to be, 1) licensed, registered and qualified as mortgage originator, 2) 'diligently work to present the consumer with a range of residential mortgage loan products for which the consumer likely qualifies and which are appropriate to the consumer's existing circumstances, based on information known by, or obtained in good faith by, the originator'¹⁵ and 3) verify to creditors that the originator has fulfilled all mortgage origination requirements. A mortgage loan is assumed to be appropriate if, 'the mortgage originator determines in good faith, based on then existing information and without undergoing a full underwriting process, that the consumer has a reasonable ability to repay' and if 'the loan does not have predatory characteristics.'¹⁶ Even though the Act explicitly states that it is not going to establish a fiduciary duty between mortgage originators and borrowers¹⁷, it also states that any compensation received by the originator when steering applicants to higher-cost mortgages will be eliminated.

It seems however, that the 'predatory characteristics' regulation under which a loan is considered predatory adheres to the existing approach of previous anti-discriminatory lending regulations. A

¹⁴ H.R. 1728, 111th Cong. (2009)

¹⁵ *Id.* Paragraph 102

¹⁶ *Id.*

¹⁷ *Id.*

more suitable measure would be to adopt a suitability duty that allows case-by-case evaluation of mortgage specific characteristics to the borrower's needs and abilities (Lehe 2010).

Conclusion

My paper contributes to the existing literature regarding the current nature of the mortgage market and how it introduced new types of discriminatory practices. The evolution of this market and its changing structure has given rise to two fundamental discriminatory practices. These were facilitated by the rapid technological advancements causing wider accessibility to financial products and mortgages and increased the number of new potential customers. As certain banks reached a national scale and were competing in a market of multiple financial products for millions of customers, centralized databases and data-processing facilities were hugely invested in. Algorithms were then introduced in the decision-making process regarding mortgage specific decisions, such as calculating credit risk, to efficiently estimate such specifics for the large number of these potential customers. The creation of the two government-sponsored enterprises (GSE)-Fannie Mae and Freddie Mac (Federal Home Loan Mortgage Corp) established the secondary mortgage market and the process of mortgage securitization, a process that inherently increased the financial complexity of mortgage products. Furthermore, the process of securitization created a segmented lending process where the responsibilities of funding, originating, serving, and holding mortgage loans were shared by a number of financial agents: mortgage originators, underwriters, mortgage brokers, assignees and arrangers. All these agents possess the means and incentives to discriminate at any point along the decision-making process; mortgage originators and underwriters can use illegitimate proxy variables in calculating the credit risk of customers that disproportionally harm minorities in order to avoid a costly examination of the applicants actual mortgage-related characteristics and credit-history; arrangers can enable these originators by 'funding them through loan purchases'. All the aforementioned factors contributed to the creation of two new discriminatory practices, predatory lending, (sometimes referred to as 'reverse redlining') and algorithmic based discrimination.

Furthermore, even an existing discriminatory practice that was once alarmingly present in the mortgage market, redlining, is not of the nature we once thought it was. The Federal Reserve Bank of

Boston provided evidence that shows that lenders do not discriminate on the basis of the racial composition of the tract, in fact the racial composition of the tract is insignificant in the lending process. Instead their results show that lenders discriminate based on the race of the applicant and not of the tract, a result of significance since existing bank regulation revolved around tract-specific characteristics, like the racial composition of the community and not the race of the applicant himself and how it might be related to the mortgage lending decision.

Existing legal doctrine has been unable to keep up with the changes within the mortgage market and the inherent discriminatory practices of algorithmic discrimination and predatory lending. For the former, the legal framework surrounding it has proved to be ineffective since it provides little to no insight on how to monitor the sophisticated statistical decision making process of today. Variable exclusion, the most fundamental piece of legislation to counter algorithmic-based discrimination has been proved to be ineffective. Theoretically an exclusion of a protected variable (e.g. race) from the algorithmic process will decrease possible pricing disparities that were caused by the inclusion of such variables. Evidence suggests though, that disparities can persist even if protected variables are excluded from the algorithmic decision making process, since a number of other variables correlating with the protected characteristic can produce this pricing difference. The problem of the excluded variable being reconstructed from a combination of other variables is particularly evident in the high-dimensional data sets of today where 'complex, highly non-linear prediction functions are used' (Gillis, Spiess 2019). Such a problem might be difficult to counter since the variables that reconstruct the protected characteristic can also be correlated with the credit-risk of the borrower, meaning that they cannot be excluded from the statistical decision making algorithm.

Furthermore, in cases that were brought to justice, where there was clear evidence of discriminatory incentives being involved in the decision-making process, courts and legislative bodies did not directly examine the process where the discriminatory decisions actually occurred but

rather focused on the mortgage originator's discretion policy. Such a course of action was chosen since it is quite difficult, apparently, to revisit the exact decision –making process and its parameters that occurred in the past. My suggestion offers a potential solution to this issue. A measure to monitor the presence of discriminatory incentives in the algorithmic procedure would be to report and compare the underwriting details that are produced by the 'Black Box' to what is actually later underwritten and assigned by the mortgage broker as a result of his discretion. In cases where there is a clear difference between these two sets of mortgage specific characteristics, one could assume that the differences are products of discriminatory incentives on the part of the mortgage broker. Thus, instead of scrutinizing the algorithmic-process itself, which is generally believed to be too complicated, a comparison between the two sets of results can offer a sense of understanding in what actually caused the pricing disparities.

In conclusion, existing Federal legislation that counters predatory lending has been proved to be too inflexible, and as a result unable to keep up with the lender innovations in predatory practices. Anti-predatory laws have developed in ways that are too inflexible 'to adapt to the evolution of the mortgage market'(Lehe, 2010). Existing definitions of predatory-lending practices allow for lenders to craft mortgage products that fall outside the scope of federal legislation. Furthermore, current antiquated legislation such as the 'holder in due course' doctrine and the 'do equity' requirement prevent borrowers from being justified in the court of law since they are either unable to tender the full amount of debt or because their mortgage originator is insolvent and the current holder of the mortgage is protected from any potential liability. Congress should pass legislation that limits the application of the 'do equity' requirement in cases of judiciary foreclosures where the borrowers claim to be victims of predatory loans. Finally, Congress and the FTC (Federal Trade Commission) need to pass legislation that completely abrogates the 'holder of due course' requirement from all mortgage assignments.

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TO: THE DIRECTOR, NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
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DEPARTMENT OF CHEMISTRY
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SUBJECT: ACRYLONITRILE
CAS NO. 100-52-7
EINECS NO. 201-100-5

RE: ACRYLONITRILE
MATERIAL SAFETY DATA SHEET
SECTION 1: IDENTIFICATION

1.1 PRODUCT NAME: ACRYLONITRILE
1.2 OTHER NAMES: VINYL CYANIDE
1.3 CAS NO.: 100-52-7
1.4 EINECS NO.: 201-100-5

1.5 RECOMMENDED PRECAUTIONS: P201+P202: Read the label carefully before use.
P203: Do not breathe dust/fume/gas/aerosol.
P204: Keep away from heat/open flame.
P205: Store in a cool, dry place.

1.6 HAZARD STATEMENT: H228: Highly flammable.
H302: Harmful if swallowed.
H314: Causes severe skin burns and eye damage.
H332: Harmful if inhaled.

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